Development Funding and Policy

The importance of information and capability building with particular reference to Tonga

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My research and the resulting thesis is the product of numerous collaborations between extremely diverse groups of people who have similar desires and concerns. All of my friends and colleagues who have been involved with EcoCARE Pacific Trust and who like me believe that participation and collaboration are fundamental requirements if change is to occur.

I have been fortunate enough to have many dear friends and relations who have seen something in me that I don't see in myself. They have been un-relenting in their support for my often seemingly pointless endeavours to attempt to participate in addressing the multitude of issues that affect each and every one of us in some way, and these dear people have encouraged rather than discouraged me to continue on. The result is that I have completed a study that I hope will contribute in some small way to a world that is a little better off because of this work.

Abstract

This thesis is concerned with international development theory and practice, and the processes of financing aid and development programs. The need for communities to have access to information in order to develop sustainable capabilities is stressed and the kingdom of Tonga is used as a case study to illustrate the process of development and the building of capabilities in individuals, communities and nations. Enpovigo, the approach used for development projects in Tonga is placed in perspective by providing a review of factors and events that influenced the evolution of contemporary development theory and practice following World War II and that are particularly relevant to the themes of the thesis. A review of financing for international development is also included with emphasis on organisations, institutions and individuals that are major sources of development funding. It is noted that many funders are driven by a 'Western' aid model, such that their main focus is on economic solutions for developing nations, often at a cost to the environment and human rights and a loss of culture and tradition. Enpovigo suggests that the outcome of development activities should be that people living in communities which are recipients of development programs should be happier than they were prior to project implementation. The activities of EcoCARE Pacific Trust which acts as a catalyst for development projects in Tonga, and operates according to the philosophy of Enpovigo, is described. Sustainability is a significant consideration in all EcoCARE Pacific projects and programmes such that the driving philosophy of Enpovigo is founded upon ecological theories and numerous development theories. Enpovigo also emphasises that knowledge is essential for the building of local capabilities and that capabilities are necessary for successful development to be sustainable. To illustrate this, projects whose objectives are to provide access to information

to schools and remote communities through the establishment of renewable energy powered Information and Communication Technologies are discussed and evaluated.

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Chapter 1 Introduction

This thesis is about international development theory and practice, and processes associated with financing aid for development. My main objective was to investigate and evaluate sustainable development through information, and the building of capacity and capability. It is hypothesised that the goal of sustainable development for communities on remote islands may best be realised through voluntary organisations, especially at the community level and is demonstrated in this thesis by the work of EcoCARE Pacific Trust and its creative approach I call Enpovigo. The hypothesis is tested by empirical findings in a case study undertaken in the Kingdom of Tonga, a small Pacific island nation. An over-arching theme of the thesis is that the happiness of individuals should be an important outcome of development.

Approach to the study

(a) Participant observation

The principal research approach taken in this study was participant observation, which involves informal interviews, direct observation, participation, group discussions, group- related literature, self-analysis, online and off-line activities and life history research (Howell 1972). Although the anthropologist Branislaw Malinowski is credited with coining the term 'participant observation' in 1922, the method had already been used extensively by other anthropologists and ethnographers, notably Frank Hamilton Cushing in the late 19th Century (Tedlock 1991). According to Howell (1972), most participant observation research progresses in four stages: 1)

getting to know the people, 2) immersing oneself in the field, 3) recording data and observations, and 4) consolidating the information gathered. Four types of participant observation identified by Howell are:

- Passive participation where the researcher plays no active role with the group and merely observes
- Moderate participation where the researcher has some direct involvement with the research group and a similar amount of time outside the group
- Active participation where the researcher fully immerses himself/herself into the group embracing its skills and customs
- Complete participation where the researcher is integrated into the group to be studied before the study commences and is likely to be an actual a member of the group.

Non-participatory observation is where the researcher has no actual contact with the population or field of study. In the present study, participant observation was an amalgam of the first three categories listed above.

Observational studies can extend over long periods of time ranging from months to many years, with longer time frames generally producing more reliable findings and consequently, stronger conclusions (Becker and Geer 1957, Mack et al. 2005). My own observational studies in Tonga effectively started in 2004 and have therefore enabled a broad understanding of Tongan life and through ongoing discussions with local people, its needs to be obtained. Either I, or other representatives of EcoCARE Pacific Trust, have travelled to Tonga to participate in projects and help implement new projects at least once each year beginning in 2005. In some years when a number of projects were being implemented I visited Tonga on several occasions; for example, in 2009 I travelled to Tonga on five separate occasions for periods of between 5-10 days each time. During each visit meetings were held with appropriate personnel who included members of the royal family, nobles, ministers, directors of ministries, church leaders, principals of schools,

doctors, members of the public, teachers and students, high commissioners, heads of businesses, fishermen, and representatives of NGOs and civil society organisations. I would take any opportunity to talk to as wide a range of people as possible about issues and potential solutions in order to obtain their views.

Idiosyncrasies relating to local customs can confound findings if observers use short time frames. For example, a simple and common illustration demonstrating the importance of extended participation in understanding cultural differences relates to eye contact and associated behaviour during conversations between an observer and a subject (Uno and Hietanen 2015). Thus, in Western cultures it is considered rude to not maintain eye contact during a conversation (Cassell and Bickmore 2000, Akechi et al. 2013), whereas the opposite may be true when having a one-on-one conversation with people from other cultures (Uno and Hietanen 2015). In Tonga (and many other Pacific Island cultures) eye contact is viewed as disrespectful. Although this example may seem relatively insignificant, it is just "the tip of the iceberg" when discussing the richness and depth of Pacific Island cultures. In my experience, immersing oneself in the culture of interest is essential for the success and sustainability of projects.

In the early years of EcoCARE's involvement in aid and development programmes in Tonga, discussions with the Minister of Education and other senior representatives of government indicated that EcoCARE did not fully appreciate that local Tongans often had project priorities that differed from those we envisaged. It was only after gaining a proper understanding of how to interact with Tongan people that trusting and honest relationships could be built, enabling all parties to participate in open and frank discussions about our collective activities.

(b) A multi-disciplinary approach: spatial scaling and macro-systems ecology

In his paper 'Spatial scaling in ecology' Wiens (1989) suggested that the "…scale of an investigation may have profound effects on the patterns one finds". To support this view he provided a number of examples of situations in which differing sized study areas gave different results. For example, under the heading "Linkages between physical and biological scales" he stated that "…in many terrestrial environments, atmospheric and geological influences may often be obscured by biological interactions. The relationships between climate and vegetation that are evident at broad scales, for example, may disappear at finer scales where they are over-ridden by the effects of competition and other biological processes (Weins 1989). This observation suggests that many effective studies need to be multi-disciplinary and that data often needs to come from studies undertaken at differing scales. In particular, scientists working at large scales need to also include in their assessment of any particular situation data that was gathered at progressively smaller scales. Wiens's view of ecology has had a significant impact on my thinking and consequently on the formulation of Enpovigo and on the way EcoCARE Pacific works.

Over the years, work on spatial scaling has been expanded upon, partially because of its relevance to the study of issues associated with climate change and associated factors resulting in scientists developing theories and tools to study multiple factors at a global level. Thus, scientists contribute to an understanding of global environmental change by undertaking studies across many scales including the individual organism, populations, communities and ecosystems and differing disciplines. By integrating studies at these various scales and differing disciplines they effectively become sub-disciplines of global ecology and present a more holistic perspective on

issues like global warming[1].The scenario given above is an extreme example of the use of a multi-scale, multi-disciplinary approach to global warming and although the Enpovigo philosophy and the EcoCARE Pacific modus operandi are not participating in such a grandiose arena the use of the multi-scale, multi-disciplinary approach is relevant.

Since the early 2000s ecological scientists have expanded the concept of spatial scaling through the development of macro-ecology[2] and more recently, macro-systems ecology[3]. Macro-systems ecologists study small, medium and large scale patterns and also interactions and feedbacks that occur across differing scales (Fei et al. 2016). By using this macro-systems approach, ecological scientists have been able to improve our understanding of environmental dynamics over areas of various sizes up to and including continents, and potentially, the entire planet (Fei et al. 2016). Thus, macro-system ecological tools enable scientists to view data at multiple scales and across a multiplicity of disciplines. Spatial scaling and approaches consistent with macro-systems ecology are incorporated into the Enpovigo development strategy, and interdisciplinary projects are a feature of the EcoCARE approach.

Development

To understand development and development theory one first needs to define 'development' a word with a multitude of meanings that differ depending on context. Common to many

[1] Refer to the journal Nature (https://www.nature.com/scitable/knowledge/global-and-regional-ecology-13228222).
[2] According to the science journal 'Nature' macroecology is "…the study of broad scale ecological patterns and processes. The focus is rarely on single communities and ecosystems, and instead looks at principles that apply more broadly such as metabolic scaling, extinction risk and diversity gradients" https://www.nature.com/subjects/macroecology.
[3] Macrosystems ecology is the study of diverse ecological phenomena at the scale of regions to continents and their interactions with phenomena at other scales that includes socioecological factors (Heffernan et al. 2014).

meanings, however, is an inference of growth, maturation, progress or progression. It can mean a new stage in a changing situation, the conversion of land for a new purpose (often with the construction of buildings), the beginning of something such as an illness, and the consequence of an action (i.e. a significant development). The journal 'World Development' provides a good example of the kind of issues dealt with in academic development studies and specifies that articles may deal with subjects such as improving standards of living, solutions to problems such as poverty, unemployment, malnutrition, disease, lack of shelter and environmental degradation. At a more practical level, the United Nations Development Programme (www.undp.org) works to eradicate poverty while protecting the planet and ensuring that all people enjoy peace and prosperity. Because the definition of development is imprecise, determining the success or failure of development activities, can be controversial. In the context of our development work in Tonga we feel that it is important that the recipients of development activities are happier after each programme has been implemented than they were prior to programme implementation. What is meant by 'happiness' is discussed below?

Two related concepts, 'economic development' and 'sustainable development' also need to be defined. **Economic development**, a term used by many authors including Sen (1983), is the process by which a nation improves the economic, political and social well-being of its people, often with an emphasis on productivity and an increase in GDP. At least in theory, economic development should result in economic progress and a general improvement in the living standards of people. The most widely quoted definition of sustainability is that of the Brundtland Commission of the United Nations, which stated on 20 March 1987 that "…**sustainable development** is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It therefore refers to economic

development conducted with minimal depletion of natural resources and by implication, low growth rate of the human population, limited pollution and diminished environmental impacts of development processes. It also infers that goods and services should be produced in ways that do not use resources that cannot be replaced, and that do not damage the environment. Shaker (2015) proposed that 'sustainability' should be viewed as maintaining a human-ecosystem equilibrium, with sustainable development being the processes leading to that point (Shaker 2015). Whether sustainability is achievable has been questioned repeatedly, particularly in the light of environmental degradation, climate change, over-consumption, population growth and the pursuit of unlimited economic growth in a closed system (Redclift 2005, 2008). For example, fisheries have a long history of debatable management and mismanagement that too often has resulted in the decline of fish populations because of unsupportable fish harvesting practices. Iceland provides a notable exception, because uniquely, it has complete control over the fishing value chain, a large exclusive economic fishing zone, a workable system of quotas and constant scientific monitoring (Alter 2009, Pirie 2016).

Laudably, the approach to sustainable agriculture, forestry and fisheries championed by the Fisheries and Agriculture Organisation of the United Nations (FAO) takes into account social, economic and environmental considerations and is underpinned by knowledge based on science (FAO 2018). In these respects it is mirrored by Enpovigo, the philosophy behind development programmes being undertaken through EcoCARE Pacific Trust in Tonga (see below), which like the FAO also aims to ensure local relevance and applicability.

At a national level Kofi Annan, the former Secretary General of the United Nations, defined a developed country as being "…one that allows all its citizens to enjoy a free and healthy life in a safe environment". However, the United Nations Statistics Division, stated that

as far as the United Nations was concerned, there is no established convention for the designation of 'developed' or 'developing' countries or areas in the system utilised by the United Nations (Division 2002). Gunnar Myrdal suggested that development is the "…movement upward of the entire social system" (Myrdal 1974), whereas others have proposed that development relates to domination and exploitation, or a change for good (McGillivray 2008). I deal in more detail with the concept of development as it relates to this thesis in Chapters 4 and 5 and propose that in essence successful development should result in an increase in the level of happiness of those participating in development activities.

Happiness

The American Declaration of Independence of 1776 includes the much quoted statement that " We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the **pursuit of Happiness**." At a personal level Lyubomirski et al. (2005) claimed that nearly all people believe they are able to move toward ever greater well-being and that happy people appear more likely to be flourishing people both inwardly and outwardly. Hence, it is believed by many that happiness benefits families, communities and individuals who gain social rewards, superior work outcomes, and 'more activity, energy and flow' (Lyubomirsky et al. 2005). Personal happiness as defined in this thesis underpins the Enpovigo development strategy and its achievement is an important consideration of all projects and programs undertaken by EcoCARE Pacific Trust in Tonga. It is discussed extensively in Chapter 4.

In April 2012 the Secretary-General of the United Nations issued a press release stating that material prosperity is important but not the only determinant of well-being. He made reference to the radical stance of Bhutan, which has adopted the goal of Gross National Happiness over Gross National Product (GDP), and noted that similar thinking was gaining ground elsewhere. The Secretary-General proclaimed that social, economic and environmental well-being were indivisible and together defined Gross Global Happiness. Subsequently, Ortiz-Ospina and Roser (2017) pointed out that life satisfaction and happiness were active research areas in the social sciences, and like the Secretary-General, they noted that social scientists often recommend that the wealth and social progress of a nation should include measurements of subjective well-being and happiness in addition to indicators of economic prosperity (Ortiz-Ospina and Roser 2017).

So, how is **happiness** defined? Firstly, it is one of those concepts that people think they understand, but in reality is very difficult to put into words. There is no conclusive definition of happiness, although most dictionaries define it as contentment, pleasure, satisfaction, cheerfulness or joy. A psychological definition of happiness states that it defines a person who experiences frequent positive emotions such as joy, interest and pride, but infrequent negative emotions such as sadness, anxiety and anger (Lyubomirsky et al. 2005). A more abstract definition with both psychological and physiological overtones considers happiness to be a state of freely available or surplus energy (Gailliot 1012). Thus, happiness can be associated with good metabolism, fewer demands on a person, goal achievements, mental resources, social support and monetary wealth – all factors that provide or help conserve energy. More prosaically, Khoddam (2015) summarised the concept of happiness well when he said it relates to pleasure and satisfaction, and to an appreciation and acceptance of life and its uncertainties

(Khoddam 2015). I like this latter definition and consider that one ideal outcome of development should be that people are predominantly happy or satisfied with their lives. This might mean, for example, that the majority of a population think that increasing GDP will make them happy; alternatively, the people may be quite happy with their current situations.

At this point it is worth noting that many scholars consider there are two main aspects of happiness. One sees 'happiness' as a value term roughly synonymous with 'well-being', whereas the other is a purely psychological term comparable to 'tranquility' (Haybron 2011). The definition relating to 'wellbeing' suggests that levels of services, affluence and comfort define it, whereas the psychological definition relates to more emotional states such as contentment, pleasure, delight and so on that contribute to ones 'happiness'. These differences in definition were illustrated by Fleurbaey et al. (2008) who used the example of two individuals, one who lived in Iceland and one in Sierra Leone. The person from the rich nation (Iceland) had access to many material benefits, health and welfare services, higher wages and so on, whereas the other came from a poor nation (Sierra Leone) and had limited access to comparable resources. Nevertheless, both gave similar responses when asked if they were happy, even though it is very likely that both would have preferred to have lived the life of the person from the rich nation and to have received the benefits offered by living in that nation (Fleurbaey et al. 2008). The similarity in their responses suggests that their personal or cognitive happiness may be defined by different values. The Icelander may perceive happiness predominantly in terms of utility, family, economic wealth and environment, whereas the African's response may have been based on family, access to food, environment, culture and spirituality. Herein lies an important point, regardless of what situation both the person from the rich nation or the person from the poor nation found themselves in they were both happy from a personal cognitive perspective. In this

example utility does not play a role in determining happiness. Happiness as a theme is explored later in this chapter and more extensively in Chapter 4.

Several other terms that are sometimes viewed as synonyms of happiness, or have subtly different, or ambiguous, meanings, also need to be discussed as they appear frequently in the literature on happiness and development. They are well-being, subjective well-being, life-satisfaction, satisfaction and contentment. **Well-being** is often seen as a synonym of happiness, but can also have a broader meaning. Thus, well-being relates to quality of life, and the state of being comfortable, healthy and satisfied with life. Under this definition well-being incorporates positive emotions such as contentment and happiness, and an absence of negative emotions like anxiety and depression. **'Subjective well-being'** refers to a self-reported measure of well-being. In a philosophical paper Raibley (2012) argued that well-being was not happiness but a broader state within which happiness was "a necessary, but not sufficient, condition for especially high levels of well-being" (Raibley 2012). In an attempt to come up with a more practical definition, Dodge et al. (2012) concluded that a universally applicable definition could be centred on a state of equilibrium or balance that can be affected by life events or challenges (Dodge et al. 2012). Some authors suggest that L**ife satisfaction** may also overlap with happiness and well-being as indicated in the definition of well-being given above others considered it to imply a cognitive (i.e. thoughtful) rather than emotional judgment of well-being (Diener et al. 1985). Ortiz-Ospina and Roser (2017) concurred with this view in stating that life satisfaction related to the evaluative side of well-being, whereas happiness referred to its emotional side (Ortiz-Ospina and Roser 2017).

The last two terms, **satisfaction** and c**ontentment**, also define aspects of happiness and well-being. Contentment denotes fulfilment, ease or peace, or a state of quiet happiness and satisfaction. Satisfaction is rather the fulfilment of one's wishes, expectations or needs, or the pleasure defined from such fulfilment. Both these terms have rather narrower meanings than well-being, but have been considered synonyms for happiness.

Overall, the significant overlap in use of these five terms and ambiguities as to their 'true' meanings has provided a fruitful stage for intellectual discussion for psychologists and philosophers. However, whether well-being should be the term of choice to describe what others define as happiness remains an open question. Tellingly, some authors have used both terms interchangeably in the same article, a good example being Denier's (2000) paper, 'Subjective well-being: the science of happiness and a proposal for a national index' (Denier 2000).

Although the philosopher Jason Raibley (2012) argued that well-being was not happiness but a broader state within which happiness was a "…necessary, but not sufficient, condition for especially high levels of well-being". I am suggesting that in the context of this thesis the opposite is true. Thus, personal happiness as determined by the individual is an all-encompassing state contributed to by conditions variously described as well-being, subjective well-being, life satisfaction and contentment, as well as utilitarian factors such as health care, education, spirituality, environmental well-being and economic benefit. Although these factors contribute to one's personal happiness they are not endpoints in themselves. It is important to make this distinction as it establishes the philosophical basis for all other activities, motivations and desired outcomes.

The 'Development Industry'

Development aid is financial assistance given by governments and other agencies to support the economic, environmental, social and political development of developing countries[4]. Aid is often provided to support local development projects, but its effectiveness is the subject of significant disagreement. Thus, although many trillions of dollars have been spent on development programmes since the 1950s (Koch 2007), numerous commentators have argued that this spending has resulted in very little benefit to the poor. Nevertheless, supporters of development aid such as the United Nations and Jeffrey Sachs argue that it provides, and has provided, a major stimulus for alleviating poverty in poor countries by providing teachers, health centres, medicines, roads etc. (UN 2005, Qian 2014). Similarly, Banerjee and He (2003) concluded that the most effective forms of aid include subsidies to families to be spent on improving children's health and education, adult literacy, de-worming, vaccination, anti-malarial sprays, fertilizers and the provision of clean water supplies (Banerjee and He 2003).

Critics of development aid such as Dirk-Jan Koch (2007) have pointed out that massive 'industries' have been established in the name of development, and that "…aid and development has become an insatiable monster". The aid budget of World Vision International, for example, exceeds the aid budget of Italy, Plan International's budget exceeds that of Greece and that of the Save the Children Alliance more than that of Finland (Koch 2007). Whether Koch's comments are entirely accurate may be debatable but they do support the idea that development has become an immense industry that requires funding, and that some people choose career options that rely on the existence of poverty, environmental degradation, disease and other aspects of impoverished nations to justify their positions. Such a viewpoint may seem harsh and I am certainly not suggesting that all people involved with aid and development do not have a passion

[4] Definition supplied by Wikipedia (https://en.wikipedia.org/wiki/Development_aid)

for the "real" issues. The individuals who started World Vision and Save the Children, undoubtedly did so, in order to improve the lives of others in a positive way. However, over time it seems that these organisations have been corporatised, requiring them to pay significant amounts of their funds for office space, paying employees, leasing vehicles and so on (Hancock 1989, Economist 2005, Fechter 2012, Werker 2012, Astroulakis 2013, Coscia et al. 2013, Avalos and Bastawy 2014, Ponte and Richey 2014, Romero 2014).

If an economics-based approach is applied to development, and in the majority of situations this has been the case, then development will logically be viewed in the context of economics and, if one is talking about national development programmes, the context is the global economy. The world's major donor organisations, for example, the European Development Fund, the Bretton Woods Group that includes the International Monetary Fund and the World Development Bank, and the United Nations are representatives of, or are governed by, our wealthiest countries and operate under the neoliberal 'post-Bretton Woods' model which promotes free global markets to solve development issues (Fukuyama 1989, Harvey 2005, Easterly 2006). The nations that determine the global context for development are, not surprisingly, the same nations that are the major donors of development funds. One might therefore, justifiably or cynically, assume that many development programmes are designed to some extent to accommodate the desires of those countries, corporations, organisations and individuals that decide the global context. In other words, the nations/organisations/corporations/individuals are likely to have self-interested economic agendas. Some organisations like the European Union unashamedly state such desires in their 'Aid for Trade' policies (Bartels 2007, Carbone 2010, Koniger et al. 2010, Adhikari 2011, Lammersen et al. 2011, Nagel and Gray 2011, World Trade Organisation 2011, OECD 2013,

Biondo 2014, Cipollina et al. 2014, Heron 2014), whereas others are less open in this regard and may barter access to resources, or unofficially insist that a nation receiving 'aid' will be required to purchase goods and/or services from the 'donor' country for its (the donor's) benefit (Freire 1970, Halme and Huse 1997, Aisbett 2003, Escobar 2003, Detomasi 2007, Hallman 2009, Vidal 2010, Borras et al. 2011, Bush et al. 2011a, Bush et al. 2011b, Buur et al. 2011, DevNet 2011, Scherer and Palazzo 2011, Schneider 2011, Vitali et al. 2011, Adeniyi and Omisakin 2012, Borras et al. 2012, Brammer et al. 2012, Cotula 2012, Praskova 2012, Zimmerle 2012, Bienkowski 2013, Michelson 2013, Oxfam 2013, Adams and Luchsinger 2015, Onoja and Achike 2015, Steinweg and Romgens 2015). Of the major lenders of funding for development[5], only the Brazil, Russia, India, China and South Africa (BRICS) Development Bank appears to provide unconditional loans, but according to their promotional literature lend only on projects that offer a relatively strong likelihood of economic profit from the investment to the lender and require that the borrower use the lender's expertise, staff and materials (Fuchs 2008).

Whether one is talking about finite natural resources or consumer-based economics, limiting factors for growth are commonly resource acquisition and consumption as described in the Club of Rome's controversial work 'Limits to Growth' (Meadows et al, 1972). The current economic growth model relies upon access to resources and the production of goods, which are bought and sold, consumed and discarded. Accordingly, Max-Neef (1992) stated that "…contrary to what is stated in textbooks, the last link of the economic process is not consumption but the generation of waste". Ironically, the vast amounts of waste generated by the Earth's cities epitomise the model to which under-developed nations are supposed to aspire, and which aid and development funding is supposed to enable (Max-Neef 1992). Since the mid-1980s, disturbing reports of

[5] European Union, the Bretton Woods Group of organisations, the United Nations, Brazil Russia, India China and South Africa and transnational and multinational corporations.

global warming, climate change, the extinction of rain forests, declining biodiversity and pollution of air and water have revived discussions about the "limits to growth" (Bunyard 1985, Donnelly et al. 2004).

The economy of Tonga

Development and the facilitation of projects and programs that enable capabilities to be achieved by Tongans, is an important focus of this thesis and needs to be seen in the context of the nation's economy and aid programs. According to the CIA Fact Book (2015)[6], Tonga has very few export items, with squash, vanilla beans and yams being its main crops, and along with fish make up two thirds of total exports. Tourism is the second highest source of income behind remittances (see below), yet Tonga is still left with a trade deficit. As of 2013 Tonga had no budget surplus (0%) and public debt that was 45.1% of GDP. In 2016 Tonga's account balance was US$-33 million, exports came to US$35 million, and imports cost US$288.2 million. As of 31st December 2016 Tonga's external debt was US$233.1 million; the country holds US$180.7 million in reserves of foreign exchange and gold.

Official Development Assistance (ODA) to Tonga

Most developing nations receive Official Development Assistance (ODA), which consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants

[6] CIA Factbook can be found at https://www.cia.gov/library/publications/the-world-factbook/

by the official agencies of members of the Development Assistance Committee (DAC)[7], multilateral institutions, and non-DAC countries[8]. These loans and grants are intended to promote economic development and welfare (Development and Countries 2016). The ODA is widely used as an indicator of international aid flow and in the 2014 financial year the net ODA per capita in Tonga was US$756.73. With a population of 102,000 that per capita value equates to Tonga receiving approximately US$77,186,460 of ODA.

Remittances

In this thesis remittances are defined as being transfers of money by persons who are living and working in places other than their homeland to individuals and/or organisations in their home country. According to Gibson et al. (2007), migrant workers remit billions of dollars to their home countries and with particular regard to Pacific Island nations "…remittances are growing faster than either aid or foreign direct investment and now total US$400 million per year".

According to the World Bank[9], remittances made up almost a third of Tonga's GDP (US$117,611,230) in 2015. However, the cost of bank transfers can be 15 to 20 percent of a bank order, equivalent to a four percent loss of Tonga's GDP (Gibson et al. 2007). In his report to the United Nations Expert Group Meeting on International Migration and Development in Asia and

[7] The Development Assistance Committee (DAC) is a forum established within the Organisation for Economic Co-operation and Development (OECD) that discusses issues related to aid, development and poverty reduction in under-developed nations.
[8] Most ODA comes from the 28 members of the DAC and equated to about US$135 billion in 2013. A further US$15.9 billion came from the European Commission and non-DAC countries gave an additional US$9.4 billion in that same year.
[9] From the Personal remittances, received (current US$) World Bank staff estimates based on IMF balance of payments data. http://data.worldbank.org/indicator/BX.TRF.PWKR.CD.DT?locations=TO

the Pacific, Richard Brown[10] discussed "….the valuable role that remittances play in providing an informal, family-based system of social protection and poverty alleviation" and suggested that "….remittances contribute positively to other social development goals such as education and health" (Brown 2008). The contribution of remittances to the Tongan economy is usually greater than that of Foreign Direct Investment[11] (Ball et al. 2013) and ODA (Brown 2008), and according to Economy Watch[12] "...the country remains dependent on external aid and remittances from Tongan communities overseas to offset its considerable trade deficit".

How valuable are remittances? There has been considerable discussion amongst researchers and others in the development industry regarding how best to use remittances (Pant 2008). Some have suggested that remittances could be made more productive if there were some way for the government to benefit from them, perhaps in the form of taxes or levies (Pant 2008). However, others believe that taxing or placing levies on remittances would likely be counterproductive as formal fund transfers would likely become informal and neither measurable, nor accessible, to government ministries that might be interested in taxing them (Gibson et al. 2007, Brown 2008, Pant 2008).

Enpovigo

The Enpovigo development strategy has evolved over a number of years and is discussed at length in Chapter 4. It is influenced by the previous work of others (Arndt 1983, Seers 1983, Streeten 1984, Sen 1985, Kaldor 1986, Mies 1986, Barbier 1987a, Brundtland 1987, Escobar

[10] Associate Professor in Economics at the University of Queensland, Richard P.C. Brown
[11] According to Gibson et al (2007) in 2006 remittances made up 36% of GDP, aid was about 16% of GDP and FDI was almost non-existent.
[12] Economy Watch, http://www.economywatch.com/economic-statistics/country/Tonga/

1987, 1988, Fukuyama 1989, Myrdal 1989, Thrupp 1989, Weins 1989, Sachs 1990, Agger 1991, McGillivray 1991, Haq 1992, Max-Neef 1992, Sachs 1992, Nussbaum and Sen 1993, Williamson 1993, Streeten 1994, Sardar 1996, Foucault et al. 1997, Hoogvelt 1997, Pieterse 1997, Avgerou 1998, Stiglitz 2000, Mohan 2001, Heeks 2003, Roy 2003, Harris 2004, Vandermoortele 2004, Veenhoven 2004, Easterly 2005, Harvey 2005, Kanbur 2005, Sachs 2005, Easterly 2006) to name but a few and it was founded upon differing aspects of many of these theories.

The Capability Approach (Sen 1981, 1985, 1999) and the importance that this theory places on the building of capabilities for successful development is an essential component of Enpovigo. Project appropriateness and ongoing buy-in by project partners, which relate significantly to participation and collaboration between donors and recipients, are also essential components of Enpovigo as in the Participatory approach (Freire 1970, Cleaver 1999). To a lesser degree, but also importantly, environment based theories (Tivy and O'Hare 1982, Redclift 1989, Beckerman 1992, Goldsmith 1997), theories regarding sustainable development (Meadows et al. 1972, Brown et al. 1987, Dixon and Fallon 1989, Beckerman 1992, Gladwin et al. 1995, Bossel 1999), sustainability (Meadows et al. 1972, Brown et al. 1987, Dixon and Fallon 1989, Corntassel 2008, Klugman 2011), spatial scaling (Weins 1989, Delsol et al. 2017), macro-systems ecology (Fei et al. 2016), and the basic needs approach (Seers 1963, 1972, International Labour Organisation 1976, Jolly 1976, Ahulawalia et al. 1978, Streeten 1979, Burki and Haq 1981, Streeten 1981, Emmerij 2010) have influenced the development of Enpovigo, as have aspects of modernism (Lerner 1958, Rostow 1960, Bernstein 1971b, Braudel 1977), neoliberalism (Dumenil and Levy 2005, Harvey 2005), globalisation (Gill and Law 1989, McMichael 1996, Kobrin 2008), post-modernism (Foucault 1982, Foucault et al. 1997) and post-

development theory (Rahnema 1986, Sachs 1990, Escobar 1992, 1997). Other theories relating to gender (Boserup 1970, Mies 1986, Jahan 1996, Bifani-Richard 1999, Sen 2006b, Hennessey 2014), culture (Sardar 1996, Gegeo 1998, Chaudhry et al. 2014) and knowledge based approaches (Chan and Costa 2005, Robeyns 2005, Turnbull 2009, Pritchard and Turri 2011, Blustein et al. 2014) have also been influential. Enpovigo can support both 'Big Push' funded programs promoted by people like Jeffery Sachs (Sachs 2005, Sachs 2007, Sachs 2012) and the 'Piece Meal' approach to project funding promoted by people like William Easterly (Easterly 2005, 2006, Easterly and Sachs 2006, Easterly and Pfutze 2008).

EcoCARE Pacific Trust

EcoCARE Pacific Trust (a New Zealand registered charitable trust) was established in 2006 to initiate and facilitate projects and programs that enable capabilities to be achieved by Tongans. It is involved in a wide diversity of activities requiring a multiplicity of skills and levels of expertise required by Pacific Island nations if they are to own, sustainably utilise and manage successful industries. Enabling access to information by local communities is a fundamental objective of the Trust in order that local communities can enjoy productive lives, generate expertise and participate in capacity building across many aspects of life.

EcoCARE Pacific Trust expresses Enpovigo (Chapter 4) through its activities, which are holistic and expansive in nature and therefore require an innovative and all-embracing approach to the execution and realisation of theory. EcoCARE also acts as an interface between the resources available in developed nations and the resources and needs required and identified by recipient nations. By acting as an interface alongside various organisations and institutions,

notably universities, local and national government bodies, private industry and volunteer groups, EcoCARE can access funds from NGO-only sources and so support the needs of individual researchers, volunteers, interns and contractors while receiving minimal overhead charges from the fund. Thus, it has initiated facilitated and accessed grants and funds for projects and programmes in the areas of health, education, the environment, electricity generation and renewable energy production for Tongan communities. EcoCARE programmes also include an extensive outreach component whereby researchers participate in communicating their project objectives and results to the wider community through public presentations, news interviews, reports and peer reviewed journal articles. The activities of the Trust are expanded upon in Chapter 5.

Organisation of the thesis

The thesis consists of six chapters and an appendix, the present chapter being Chapter 1. A brief outline of the subsequent chapters is given below.

Chapter 2: The evolution of modern development theory: a review of the literature provides a condensed review of factors and events that influenced the evolution of contemporary development theory and practice following World War 2 and which are particularly relevant to the themes of the thesis. It also includes a review of influential contemporary development theories and introduces the reader to a number of indigenous development scenarios.

Chapter 3: Financing for development focuses on organisations, institutions and individuals that are major sources of development funding. These sources are predominantly driven by a "Western" aid model such that their main focus is on economic solutions for developing nations, often at a cost to the environment, human rights and a loss of culture and tradition.

Chapter 4: Enpovigo: capability, participation and happiness describes a development strategy that has evolved over time through the work of EcoCARE Pacific Trust in Pacific Island nations, predominantly Tonga. It is suggested that the Enpovigo development strategy will encourage happiness and well-being through its ability to facilitate the building of capacity and capabilities of individuals, communities, nations and regions that enable them to make informed choices and to implement projects and programs that result in them achieving their desired outcomes. It is also suggested that the acquisition of capacity and capabilities are a direct response to the utilisation of acquired knowledge through access to information. The outcome of Enpovigo is therefore the sustainable self-determination of individuals, communities and nations to choose their own paths through the empowerment that knowledge presents. It is proposed that successful development has been achieved when a nation no longer requires aid, remittances, loans or other forms of financial support to maintain its economy and when members of its population are predominantly happy with the lives they lead.

Chapter 5: Case study: EcoCARE in Tonga describes development projects facilitated by EcoCARE in Tonga and examines their successes and failures. Projects are considered in three major groups that deal with educational issues, implementation of sustainable energy and communication technology, and health related themes.

Chapter 6 Concluding discussion draws together the main threads of the thesis.

Appendices includes a personal account of events in my life that led to the development of Enpovigo and why EcoCARE Pacific Trust was established, requests made for our assistance, project documents, press releases and so on. It also includes documents associated with some of the larger programs with which EcoCARE has been involved.

Summary

In summary, my background as a builder and ecologist led to the construction of the Enpovigo[13] development strategy, which incorporates ecological principles into development projects and programmes. The broad aim of these projects is to develop skills and expertise among local communities so that individuals can enjoy increasingly happy lives. The formation of EcoCARE Pacific Trust (a New Zealand registered charitable trust) was designed to facilitate the expression of the principles of Enpovigo and the construction of the Enpovigo Development Strategy helps to illustrate a conceptual pathway that remote, impoverished communities can theoretically take towards achieving their desired outcomes. The activities of EcoCARE Pacific Trust emphasise collaborations, participation, project integration, the scientific method and long-term vision in the design of short, medium and long term projects. Enpovigo emphasises that knowledge is essential for the building of local capabilities and that capabilities are necessary for successful development to be sustainable. Information builds knowledge and I believe that access to information through renewable energy powered ICT usage is currently the best option for remote island communities to use to access information.

In this thesis I hypothesise that:

- Holistic programmes can be constructed that enable the development of a multiplicity of skills so that local populations can effectively participate for the national benefit
- The goal of sustainable development can be realised on remote islands through voluntary organisations, especially at the community level

[13] Enpovigo theory suggests that capacity and capabilities of individuals, communities, nations and regions can enable them to make informed choices and to implement appropriate projects and programmes that result in them achieving their desired outcomes.

- Contemporary development theories and funds are frequently ineffective in supporting sustainable development.

Finally, I suggest that the happiness of individuals be an important outcome of development funding and activities?

Chapter 2. Evolution of modern development theory: a review

Introduction

This review focuses on the evolution of modern development theory from its beginnings at the end of World War 2 to the present day. A great number of theories about development have emerged, and it would be impossible and irrelevant for me to attempt to discuss them all. Therefore, I have selected theories that have had significant impacts on development perspectives and activities during this period. I also introduce the reader to theories that have influenced the developmental philosophy I call Enpovigo, which is the subject of Chapter 4. Enpovigo incorporates aspects of a number of contemporary development and ecology-based theories that address basic human needs, environmental degradation, political and social stability and cultural diversity. In doing so it draws on the basic needs approach to development, sustainable development theory, dependency theory, theories associated with ICT-based development, environment-based theories, and gender, culture and knowledge-based theories. Sen's capability approach, the participatory approach, and aspects of Modernism, Neoliberalism, Globalisation, Post-modernism and Post-development theory have all made significant contributions to Enpovigo. These theories are discussed in this chapter and some are expanded upon in Chapter 4 where the philosophy behind Enpovigo is explained in detail.

Although the bulk of this chapter focuses on a development era that began after World War Two (WW2), it also includes a short summary of pre-WW2 events, which significantly impacted on the formulation of philosophies behind contemporary development theory. The reader is introduced to the idea that there are a plethora of theories that have arisen in the name

of ‘development’, most of which were predicted to have universal applications. I argue that because situations differ markedly from one another, so too will potential solutions. Consequently, it is unlikely that one theory can be universally valid and/or effective; rather I suggest that it is more likely that aspects of several theories will be applicable in particular situations. This is not to say that the theories which have emerged do not address issues or situations that perhaps stimulated their formation in the first instance. Rather, the issue for me relates to the ongoing and universal application of ideas that may have been designed to fit specific sets of circumstances in particular locations, at specific times. Consequently, the Enpovigo development strategy has been influenced by, and is founded upon, the work of numerous researchers. At the present time, Enpovigo provides the philosophy behind a development strategy for remote Pacific island communities.

Historical Perspective

Pre-World War 2

World War 1 (1914-1918) was described by H. G. Wells as the” …war that will end war” in an article in The Daily News, 14 August 1914. The post-WWI period (the 1920s) saw a decade of incredible public enthusiasm for investment into amazingly buoyant global stock markets. During this period the majority of developed nations, including the USA, Britain and Germany, had successful market-driven economies. People living in the vast majority of westernised nations were excited by the prospect of a bright economic future and the fervour of investment into booming economies was not restricted to stockbrokers and financiers. A significant

proportion of the general public was making considerable investments into what was perceived to be a strong global market. In 1925 stock markets saw artificially inflated stock prices begin to trend upward, and in 1927 the rising stock prices saw an even greater number of people being enticed to invest. By 1928 the US stock market was offering significant returns on ever increasing speculative investments.

Throughout this boom time confidence in market-driven economies was so strong that stock-brokers would lend investors up to 90% (termed "buying on the margin") of the price of stocks. Consequently, people who would not normally buy stocks and shares because of a lack of spare funds were able to borrow the majority of an investment from brokers. 'Average people' were making millions of dollars from speculative investments, which in-turn encouraged others to take up loans from brokers and banks so they too could make perhaps even riskier, speculative investments.

However, 'buying on the margin' was perilous as it meant that if the price of stocks fell lower than the equivalent amount borrowed, the broker could insist that the borrower immediately pay back the amount of the loan. With many lenders offering a very high percentage of the cost of stock purchase, borrowers were potentially in a very dangerous situation. Many companies were investing their reserves into stocks, and banks were investing their customers' uninsured savings. To many people it seemed that the rise in stock value was never going to end and that values would keep trending up.

The Great Depression

By October 1929 a huge stock market crash seemed inevitable and panicking brokers sent out a call for 'margins' to be settled. Over a very short period of time billions of dollars were lost and the door to the "Great Depression" had been opened. This economic depression was destined to become the longest, most widespread and deepest depression of the 20th Century (Duhigg 2008). In the USA alone over 9,000 banks closed their doors and in cases where bank deposits were uninsured, investments and savings were lost. Loss of faith by the public in the economies of affected countries contributed to a reduction in spending, which in turn contributed to lower productivity and loss of jobs. In an effort to protect US businesses, the US government imposed the US/Europe Economic Policy resulting in international trade being reduced by 50%; unemployment in the USA rose to 25% and in some other countries it rose as high as 33% (Frank and Bernanke 2007).

After WW1 and just prior to the Great Depression, Germany found itself in the dangerous situation of having had to borrow funds from the USA and other nations to rebuild its cities and infrastructure that had been destroyed. As the Great Depression began to reap havoc on the global economy, loans were called in and nations that had been philanthropic during the 1920s withdrew their support. The impact of this combination of factors led to massive unemployment and poverty in many countries including Germany. There seems to be general agreement that the impact of the Great Depression contributed significantly to kindling the fire that fanned the flames of World War 2 (Frank and Bernanke 2007).

The faith shown by governments, companies, financial institutions and the general public in the unfettered, market driven, economic model had proved to be a serious error in judgment. The global market place was in disarray and moving quickly towards a catastrophic global economic meltdown. People everywhere were looking for saviours and in Germany they thought

they had found one in Adolf Hitler. Hitler offered an alternative option, a state managed economy that looked to secure the nations resources.

World War 2

The events of WW2 are well documented and for the purpose of this thesis it is unnecessary for me to elaborate extensively on what occurred during those horrific times (1939-1945). It is sufficient to say that the majority of our planet was affected in some way by the events of this terrible conflict, which resulted in the torture, injury and death of many millions of people and almost complete destruction of many nations' industrial and manufacturing capabilities. Many nations became indebted to the United States (USA) after WW1 and became even more indebted after WW2. The USA was one of the nation's least affected by the events of WW2 and although many US military personnel died during the war, infra-structure on continental America remained intact. The USA was therefore able to maintain its manufacturing capability by producing military hardware for the allies throughout the war at a financial cost to the purchasers.

The Post War Period

The USA supported the rebuild of much of the destroyed infrastructure of its allies by providing loans that ensured they had the ability to produce goods without competition. Factories that once made war machines were converted during peacetime and began manufacturing vacuum cleaners, cars, radios, farm machinery and so on. Upon their return, servicemen and women

found they had savings that had remained untouched while they were overseas and were in a position to purchase homes, cars and other commodities.

WW1 and WW2 had left the USA a very wealthy nation with significant capacity in both manufacturing (at the time the USA was capable of supplying 50% of the world's manufacturing needs) and areas of finance. The extensive destruction that occurred in the majority of other nations meant that the USA had very little competition in manufacturing and industry. However, extensive poverty and the destruction of infrastructure in many first world nations left the USA without markets from which to benefit. Re-building a devastated global economy and halting the spread of communism became imperatives of the USA's post-WW2 policies and activities.

In April 1946 an effort to rebuild the global economy saw the formulation of the General Agreement on Tariffs and Trade (GATT) in Geneva. GATT was a multilateral agreement designed to regulate international trade and preceded the World Trade Organisation (WTO)). The USA wanted and needed Europe to prosper once again, so its government formulated a plan to help rebuild Europe (Hogan 1987). The European Recovery Programme (ERP), or the Marshall Plan as it became known, was designed to speed up the re-building of war-ravaged regions, modernise industry and expand upon the outcomes of GATT. In the meantime the Soviet Union (as it was at the time) formulated the Molotov Plan designed to provide aid to rebuild countries in Eastern Europe.

The Marshall Plan was an American initiative created to lend or grant monetary support to nations to enable them to finance the rebuilding of their war-ravaged economies and to help prevent the march of communism (DeConde et al. 2002). To help facilitate the rebuild, significant funds were required and an organisation was created to disburse the funds. The USA

took the lead by playing a significant role in the formation of the International Bank for Reconstruction and Development (now a member of the World Bank Group), which was established in 1944 and the International Monetary Fund (IMF), established in 1945. These institutions were initially created to implement development initiatives through multiple forms of loans. Included in the economic re-build initiative was the removal of trade barriers facilitated through the formation of GATT and the modernisation of European industries, which were considered to be primary instruments of the ERP rebuild philosophy of that time.

Evolution of Contemporary Development Theory

It is generally accepted that modern development activities and theories had their beginnings after the Second World War with United States President Harry S. Truman's inaugural address on the 20th January 1949 when he said:

> "We must embark on a bold new programme for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. The old imperialism — exploitation for foreign profit — has no place in our plans. What we envisage is a programme of development based on the concept of democratic fair dealing".

These were fine sentiments, but it seems that the re-building of European and Asian economies, the USA's desire to entice poor countries away from communism during the Cold War (1944-1991), and the introduction of newly independent former colonies into the global economy were also significant factors in those early attempts at generating development theories and initiatives. Technologies, processes and systems that were created to fight the Second World War were modified and re-assigned to 'fight a new battle'. Plans were made for the rebuild of

Europe and Japan and the formation of the Bretton Woods institutions (most notably the World Bank and the IMF) signalled a new determination to avoid the economic problems that had led to the Second World War.

Economic Models

In the1940s and 1950s it was thought that the success of a nation lay in the state of its economy and that the success of development processes could be measured by a nation's economic performance (Sachs 2000, McKay 2008). Furthermore, it was believed that development could only be attained through economic growth and that success should be measured using GDP (Gross Domestic Product), GNI (Gross National Income), or some other gross economic indicator deemed to express successful development (ILO 1976). During the early post World War 2 years the economies of many nations around the world were devastated, either from the looting of their financial reserves and assets, the destruction of infrastructure, loss of skilled people and/or through the extensive costs associated with fighting the war. Consequently, development theories were based on economic models that had been generated at the time and were conceived to ease those economic stressors and to re-establish national economies. Ongoing belief in the relevance of comparable mathematical economic models has remained strong.

Manfred Max-Neef, the Chilean economist, commented 26 years ago that economics had become highly influential in decision making, a trend that was to continue (Max-Neef 1992). As is generally the case with coarsely targeted assessment tools, broad concepts such as Gross National Product (GNP), growth rate, capital accumulation and the like are discriminatory and

selective. In the 1940s and subsequently, people like Gunnar Myrdal (1944), Manfred Max-Neef (1992) and Lorenzo Fioramonti (2013) repeatedly warned against the use of economic outcomes as the sole or principal method of evaluating success or failure of development and aid policies, projects and programs, because of their limited perspective and lack of regard for other factors that may appear to be unrelated to the economy. Thus, Max-Neef (1992) suggested that because of the limited perspective that economic indicators offer, a significant proportion of a population becomes, 'statistically invisible'; similarly, Fioramonti (2013) argued that GNP is unable to include a number of factors that can influence the accurate assessment of life's realities for many members of a population.

Max-Neef (1992) also noted that there are "...activities that take place through the market mechanism, regardless of whether or not such activities are productive, unproductive or even destructive". The result of such limitations is that the dominant economic theories assign no value to tasks carried out at subsistence and domestic levels. Consequently, such theories are unable to embrace the poorer sectors of the world or the majority of women (Fioramonti 2013). In economic terms, this means that almost half the world's population-and more than half the inhabitants of the Third World turn out to be statistically 'invisible'. Debate continues over the applicability of various economic measures used as indicators of development success. However, if the economy alone is used as the determinant of development success, then the statistically 'invisible' will remain 'invisible' (Max-Neef 1992, Fioramonti 2013).

Gunnar Myrdal, regarded by many as one of the most important theorists in areas of international relations and development economics, suggested that economists should view the world more holistically (Myrdal 1944, 1970, 1974, Panico and Rizza 2009). In his article "What is Development?", Myrdal (1974) suggested that the use of purely economic models, concepts

and approaches can lead to "…superficiality and gross mistakes", a suggestion made at a time when main stream economists were strongly in favour of development based on 'equilibrium theory', which proposed that market forces would stabilise disturbances in an economy. Others supported his suggestion that development analyses which focus only on economic outcomes are potentially irrelevant and misleading since they fail to acknowledge sociological, cultural, historical or institutional factors (Myrdal 1944, 1970, Fujita 2004, Panico and Rizza 2009).

Myrdal valued 'equality' as an important premise and expressed an idealistic vision of a welfare world that could minimise the ever widening gap between rich and the poor nations (Myrdal 1989, Panico and Rizza 2009). He also discussed 'circular causation' a concept that suggests that if one thing changes other things will change in response, i.e., they are interdependent (Myrdal 1974). As an example he commented that "improved nutrition will tend to raise productivity of labour, while higher productivity normally will increase the opportunity to improve nutrition". In addition to Myrdal numerous other scholars began to express comparable views that development programmes and approaches need to be 'holistic' in nature (Seers 1963, Myrdal 1968, Seers 1969, Meadows et al. 1972, Streeten 1972, Myrdal 1974, ulHaq 1976, Seers 1979a, Streeten 1979, Leipziger and Lewis 1980, Sen 1981, Rahnema 1986, Brundtland 1987, Escobar 1987, Redclift 1989, Sachs 1990, McGillivray 1991, Haq 1992, Max-Neef 1992).

Modernisation Theory (1950s and 1960s)

As global, national and local needs and situations changed, and as technology improved, development theories evolved. Early development theories originated from scholars in the USA

who had no real experience of studying Africa, Asia, Oceania or Latin America; however, they were significantly influenced by the events of the recent past. Probably as a result of the negative impacts of the Great Depression, and because the pre-WW2 free market models had contributed to the global economic meltdown, theorists initially, looked more towards state managed economic policies that supported modernist philosophies (Weber and Parsons 1958).

During the 1940s, 50s and 60s many development theorists suggested that modernisation, and in particular modernisation that occurred in the USA, should be viewed as the model to which all others should aspire: "…all nations, however poor, were able, with the implementation of correct policies to achieve a modern standard of living by following exactly the same path as that pioneered by the western nations" (McKay 2008). The statist model (state driven and managed) was at its height during the 1950s and 1960s and Kanbur (2005) suggested that interest in it owed a great deal to the rise of Fabian socialism in Britain (Kanbur 2005).

The dissatisfaction with market-driven economic models felt by many in the West was reinforced by the success that the Soviet Union appeared to be having during the 1950s and 1960s. Its state-managed economy appeared to present a better option for many nations. Communism seemed to illustrate the benefits of the statist model and presented a valid alternative to the free market economics that had such catastrophic effects during the 1930s and 40s. Latin American countries had been independent from their colonial masters (Spain and Portugal) for some time, and their struggle was seen as being for economic independence from US market forces. It is interesting to note that as East Asia emerged from the Korean War, the US influence was such that both South Korea and Taiwan embraced the statist economic model. China of course had its own variant of state controlled development.

Among other things modernisation required nations to change, to embrace industrialisation, to manufacture goods and in doing so, to reject tradition. W. W. Rostow, an American economist and proponent of the modernist perspective, suggested in his book 'The Stages of Economic Growth: a Non-Communist Manifesto' that traditional societies needed to change because tradition inhibited the process towards westernisation (Rostow 1960). Other authors such as (Landes 1998) noted that over the past 400 years the West had emerged as the economic and political centre of the world and that Western countries represented the archetypal form towards which all modern societies and poor nations should progress. Academics such as Rostow and Landes believed that the road to modernity, and by implication successful development, was the path taken by the USA.

The economist Adam Szirmai agreed, and suggested that under-developed nations could only achieve the benefits of a strong economy as realised by Western nations through westernisation, because development and westernisation were inextricably entwined. He went on to suggest that development could not occur without modernisation and significant cultural change (Szirmai 2005). Bernstein (1971a) reinforced Szirmai's opinion regarding modernism and tradition and stated there must be fundamental societal change before a nation could progress towards successful development. He considered traditional societies to be 'economically backward', and modern societies 'economically advanced'.

According to proponents of modernisation theory, modernisation and tradition are inextricably associated with the state of a country's economy (Rostow 1960, Lerner 1964, Bernstein 1971a, Braudel 1977, Williamson 2003). Thus, if a country's economy resembled that of the USA it was considered to be an advanced (developed) nation, whereas if tradition was strong, it was by implication a backward economy and therefore an under-developed nation. The

irony of these suggestions is that most European nations, including Britain, and also China and Japan, all of which can be considered to have modern, developed societies, retain significant traditional societal components, and in many cases patriotic nationals will fervently defend their strong traditions. Furthermore, in contradiction to the 'requirement' of modernist theoreticians that nations must discard their traditions in order to become developed, the epitome of modern societies, the USA, celebrates Thanksgiving, Independence Day and other historical events.

During the 1960s and 70s modernisation was so influential that it expanded its academic reach to not only encompass economics but also social sciences, geography and political sciences. In each of these disciplines it offered the same promise that, "…all nations, however poor, were able, with the implementation of correct policies to achieve a modern standard of living by following exactly the same path as that pioneered by the Western nations" (McKay 2008).

Rostow's five steps

The work of W. W. Rostow built on that of Adam Smith the 18th century philosopher and 'father of capitalism' and had as its basic premise that traditional societies must modernise to develop. His 'Stages of Economic Growth model' (Rostow 1960) postulated that economic growth occurs in five basic stages: (1) traditional society, (2) the pre-conditions for take-off, (3) take-off, (4) the drive to maturity, and (5) the age of high mass-consumption. Rostow considered that countries go through these stages in turn, although the stages may be of varying length. As a proponent of the modernist philosophy he felt that the state should play an essential role in the development process by providing infrastructure, social welfare, security and the appropriate political and

geographical space in which the differing stages of his model could be played out (Edelman and Haugerud 2007).

Rostow's writings were embraced by theorists and practitioners alike and according to the Boston University economist Alistair McKay (2008) were not only the most influential works of their time, but continue to be so today. Because he believed the role of the state to be essential, Rostow considered that the failure of any nation to develop when applying his tenets was due to a lack of commitment by that nation, rather than to limitations of his theory.

Modernisation: the 'Trickle Down Effect'

The Oxford English Dictionary defines trickle-down economics and 'trickle-down' theory as referring to the idea that tax breaks or other economic benefits provided by government to businesses and the wealthy will benefit poorer members of society by improving the economy as a whole. Similarly, modernisation theorists have suggested that if developed nations are economically successful, some of that success will 'trickle down' to poorer nations. However, 'trickle down' benefits are inevitably provisional on poorer nations implementing particular conditions and policies. This line of reasoning has had much support and 'modernist' economic theory has influenced policy making of a number of international institutions in the field of development, most notably, the World Bank Group and the IMF (McKay 2008).

In recent years we have tended to attribute 'trickle down' theory to the Ronald Reagan presidential period in the USA or to Margaret Thatcher's prime ministerial reign in the UK, despite it not being a recent phenomenon. The economist John Kenneth Galbraith noted that 'trickle-down economics' had been tried in the United States in the 1890s and wrote that "…Mr.

David Stockman has said that supply-side economics was merely a cover for the trickle-down approach to economic policy—what an older and less elegant generation called the horse-and-sparrow theory: if you feed the horse enough oats, some will pass through to the road for the sparrows". In New Zealand, the Labour Minister of Finance, Roger Douglas, promoted the benefits of 'trickle-down' in his 'Rogernomics' policies of the 1980s, but in 2011, an opposition member of parliament, Damien O'Connor, called trickle-down economics 'the rich pissing on the poor' in a video made to launch the election campaign of the New Zealand Labour Party.

There has been, and continues to be, disagreement amongst economists regarding the effectiveness of 'trickle-down' economics to deliver on its promises. However, numerous researchers (Arndt 1983, Aghion and Bolton 1997, Kobrin 2008, Andreou 2014) have suggested that in most instances poor people in rich nations have not benefitted from 'trickle down' and neither have poor nations benefitted from rich nations getting richer. During the 1960s the use of economic models for development came under increasing criticism from institutions such as the International Labour Organization (ILO) and from thinkers including Dudley Seers, Gunnar Myrdal, Paul Streeten, Hollis Chenery and Mahbub ul Haq (Szirmai 2005). Scholars such as these suggested that although economic indicators used to evaluate success or failure of development programs may have suggested that an economy was growing, often the living conditions of the poor within these nations had not changed (Myrdal 1970, Streeten 1972, International Labour Organisation 1976, ulHaq 1976). Amartya Sen the Indian economist and philosopher also criticised the narrow focus of modernist economic models, stating that even though a country's economy might grow rapidly, it may still have unsatisfactory levels of literacy, health, life expectancy and nutrition (Sen 1999).

By the 1980s ‘modernisation’ was increasingly being referred to as ‘westernisation’, in part because it typically ignored differences in culture and circumstance and focussed only on economic and material growth, which, as it happened, principally benefited the West (McKay 2008). Furthermore, not only were some undeveloped states not benefitting from ‘trickle down’, but they were becoming more impoverished (McKay 2008). Max-Neef (1992) had earlier propounded this same view commenting that there “…is still insistence to the effect that processes such as the so called ‘trickle-down effect’ work, despite some overwhelming evidence to the contrary, especially in many Third World countries” (Max-Neef 1992).

The narrow focus of modernist economic models was criticised by American cultural anthropologist Amy Den Ouden who suggested that development programs should embrace culture and tradition rather than require their dismemberment and replacement by some approximation of western social structure (Ouden 2013). Not only does embracing culture and tradition maintain links with the past but it can lead to the enhancement of development programmes. For example, the failure of agricultural initiatives introduced by the United Nations Food and Agricultural Organisation (FAO) in Africa two decades ago was directly related to ignorance of local customs. Thus, the FAO had tried to implement programmes through male power structures in contexts where women had the real knowledge base and where they indeed did 90% of the work (Koutsouris 1998). Similarly, the United Nations had tried to foster individualistic models on cultures within which the community took precedence over personal success (Koutsouris 1998). These examples indicate that without an understanding of a community’s culture and tradition and without extensive involvement and collaboration between all partners development programmes may well be ineffective and non-sustainable. I have already indicated that it is disrespectful to stare into another person’s eyes in Tonga (Ratcliffe

2013, Turner 2016) and knowing such customs is imperative for successful interactions between partners in development. EcoCARE Pacific's interactions with relevant parties in Tonga have included extensive discussion to ensure as much as possible that all appropriate steps have been taken to address concerns relating to project implementation (see Chapters 4 and 5), but despite these efforts failures and adjustments have been needed to rectify unforeseen, often cultural, issues that have arisen.

It is apparent that many development initiatives and programmes based on modernist economic models have not delivered life styles to poorer nations similar to those of richer developed nations. Indeed, they generally appear to have been more profitable to the 'developer' nations (Hoogvelt 1997, Escobar 2003, 2005). This is not to say that all aspects of 'modernist' development philosophies should be discarded. The importance of the role that local/national governments might play in development programmes should not be under-estimated, but their initiatives need to be tailored to the undeveloped nation's attitudes and culture. The path that a nation chooses for itself, and its attitudes to its own culture or cultures, may or may not fit with the step wise development processes suggested by authors like Rostow, but nevertheless, some aspects of 'modernist' philosophy are included in 'Enpovigo'.

Dependency Theory

The dissatisfaction felt by many poor nations with outcomes of their involvement with modernist styled development policies, the modernisation of society and the consequent disestablishment of traditions, led some poor nations to look for alternative options. Dependency theory, which found its origins in 1949 through the writings of Raul Prebisch, an Argentinean economist, and

Hans Singer a German Development Economist and Secretary to the United Nations Economic Commission for Latin America during the late 1950s, suggested that poor nations were trapped into a cycle of poverty whereby the rich nations were using them as a source of raw or partially processed materials and cheap labour. Prebisch (1949) and Singer (1950) suggested that poor nations should dissociate themselves from the global market place, and by doing so, break out of the 'dependency cycle'. Prebisch argued that the reason for lack of growth of impoverished nations in Latin America lay in their position at the bottom of the value chain (Ferraro 2008).

Immanuel Wallerstein an American sociologist built upon the work of Prebisch, Singer and the Hungarian Karl Polanyi[14] and his World Systems Approach (Wallerstein 1976) influenced dependency theorists in the mid-1970s by suggesting that countries should be placed into categories that defined whether they should be in the core (the most developed countries), the semi-periphery that included declining economies (producing goods for rich nations in the core), or the periphery where the least developed nations (exporters of raw materials and cheap labour) would be found. According to Wallerstein's model, communities living in nations in the periphery would supply raw materials and cheap labour to those living in the semi-periphery and the core. Populations from the semi-periphery would then process those materials and move them to the core where the semi-processed and processed materials would have 'value added'. The goods would then be sold back to populations in the semi-periphery and periphery for far more than the price paid by the core for materials and labour. The result of such relationships is likely to be that neither the semi-periphery nor periphery nations will ever attain the level of development realised by nations in the core. In other words, unless they are able to compete with core nations, they will remain peripheral.

[14] Karl Polanyi is the originator of substantivism, a cultural approach to economics, which emphasised how economies are embedded in society and culture.

Fernando Henrique Cardoso a social scientist who became President of Brazil also supported dependency theory, but believed that development of peripheral nations could occur under what he called 'associated-dependent' developmental relationships (Cardoso and Faletto 1979). This form of development supported the idea of substantial domestic ownership of industries and the need for a strong political and social structure to guide development.

Neo-liberal Economic Theory

The 'counter revolution' that is neo-liberalism (Toye 1987) suggests that markets can deliver benefits offered by developed nations to poor nations more effectively than can governments, and that market-driven development programmes are essential requirements for success. The United States, United Kingdom and Australia are strong supporters of the idea of minimalist state involvement in development initiatives, whereas much of Western Europe supports a more traditional range of government involvement and responsibility, similar to those described earlier under a modernist framework. Although there have been significant criticisms levelled at neo-liberal philosophy, including its model of democracy and its ability to reduce poverty, neo-liberalism has played a significant role in discussions regarding the nature of European Union Official Development Assistance (Crawford 2010).

From the mire of dissatisfaction with dependency theory and modernist economic perspectives, neo-liberalism emerged as what was then considered to be a viable alternative, and one that continues to dominate contemporary debate about development. The development economist Peter Thomas Bauer suggested that neo-liberalism "…addresses the theoretical deficiencies of modernism and dependency" (Goncalves 2006). It does seem ironic however, that

although it was market driven economics that led to the Great Depression and WW2, a modern day version of market led economics, neo-liberalism, has become the cornerstone of modern economic theory.

Proponents of the neo-liberal model have suggested that state engagement leads to poor outcomes, inefficiencies and lack of international competitiveness, and also requires the implementation of on-going subsidies and protection. They suggest that businesses suffer when they need to spend precious time lobbying and pandering to the state for subsidies and protection rather than engaging in productive activities (Fukuyama 1989, Larner 2000, Harvey 2005). The noted American political economist, Francis Fukuyama was so enraptured by neo-liberal ideals and philosophies that he suggested, "…we may be witnessing not just the end of the Cold War or the passing of a particular period of post-war history but the end of history as such: that is the end point of man's ideological evolution and the universalisation of Western liberal democracy as the final form of human government" (Fukuyama 1989).

As the market driven philosophy gained ever more traction, merchants, entrepreneurs and other business people in developed and developing nations organised themselves into groups and communities that were able to use their collective pressure to demand the removal of market constraints by the state (Escobar 1987). For most people living in developed nations in the current millennium the use of political pressure by industry for its own benefit seems relatively commonplace. Pressure exerted by industry in modern society is well illustrated by the example of on-going court cases, obstructive actions and eventual decisions regarding the cigarette industry whose products have resulted in the deaths of millions of people worldwide (Drope and Chapman 2001). Similar scenarios revolve around the weapon and armament industries, including political struggles in the USA between government and 'right to bear arms'

organisations including the National Rifle Association and the Gun Owners of America. Escobar (1987) also warned of the inherent dangers that market driven, economy-based decision making can have when he stated, "In its mature form, the self-regulating market implied, on the one hand, the full commodification of labour, land and money - and consequently, the subordination of all social aspects to the laws of the market - and on the other, the constitution of the economy as an autonomous realm, separate in particular from morality and politics".

With the advent of scientific and technological advancements initiated at the time of the Industrial Revolution, previously modest and disjointed Western economic institutions attained great power. A prerequisite for the success of the free market economic model was that society, the environment and the state were less important than labour, land and the economy (Polanyi 1957). Some authors (Polanyi 1957, Escobar 1987) even went so far as to suggest that commodification of land and labour was the central organising principle of society. However, E. M. Dodd of the Harvard Law School had already warned that the 'primitive accumulation' of land in the sense of (Escobar 1987), actually meant the dispossession of land from its current occupants and the accumulation of land by a few (Dodd 1946, Goncalves 2006). Often such losses of land were facilitated through forcible eviction, purchase of lands during difficult times, rising prices, the discovery of precious metals, public debt, foreign trade, slavery and state regulation or privilege (Escobar 1987).

Commodification of land and labour has been escalating since the 1980s. From 1990 to 2007, global cultivation of land increased by 1.9 million hectares (ha) per year to about 1.5 billion hectares and has continued to increase since then by an average of 5.5 million ha per year in under-developed countries (Bhatt 2013). Key commodities driving this expansion have been vegetable oils (including palm oil and biodiesels), sugarcane, rice, maize, and plantation forests.

Bhatt (2013) estimated that at least 6 million ha of additional land would be brought into production each year until 2030 and a number of authors (Griffin et al. 2002, Kachika 2009, Vidal 2010, Bush et al. 2011b, Deininger and Byerlee 2011, Deininger et al. 2011, Araghi and Karides 2012, Borras et al. 2012, Praskova 2012, Bhatt 2013, Bienkowski 2013, Onoja and Achike 2015) consider that land appropriation and exploitation is set to continue at an ever increasing rate. Tragically, many people have been forcibly evicted in the name of economic development, and "…land grabs have gone hand in hand with environmental destruction, conflict and war, forced labour, child labour, illegal expropriation of natural resources, widespread poverty and serious violations and abuses of human rights" (Bhatt 2013).

Despite these criticisms, a neo-liberal approach to development is seen as an attractive option by many as it does not mean the adoption of a rigid model as with many Modernist theories, and there is no requirement for implementation in progressive stages as prescribed by authors such as Rostow. Indeed, the geographer David Harvey suggested that neo-liberalism was designed "…to disembed capital from these [government] constraints" (Harvey 2005). Proponents of the neo-liberal model have also suggested that development failures were not the fault of neoliberal philosophy, but rather the fault of unsuitable government policies, institutional deficiencies exacerbated by corruption and favouritism, and excessive state intervention (Friedman 1962, Harvey 2005). Along similar lines Miller and Kim (2015) stated that the basis of economic freedom is to empower people, thereby giving them "…more opportunity to choose for themselves how to pursue and fulfil their dreams, subject only to the basic rule of law and honest competition from others".

Less state involvement and more entrepreneurial market driven determination of national development-related activities were also seen by Harvey (2005) as positive features of the

neoliberal model. According to him "Neoliberalism is …a theory of political economic practices that proposes that human well-being can best be advanced by liberating individual entrepreneurial freedoms and skills within an institutional framework characterised by strong private property rights, free markets, and free trade" (Harvey 2005). Milton Friedman suggested that the state was only there to support basic public services and stated that "To the free man, the country is the collection of individuals who compose it, not something over and above them … The scope of government must be limited … to preserve law and order, to enforce private contracts, to foster competitive markets" (Friedman 1962). Like Friedman, Miller and Kim (2015) suggested that the best way to increase wealth and economic growth is for governments to implement policies and reforms that "…drive entrepreneurial activity, creating more opportunities for greater economic dynamism". Tellingly, they also noted that countries that have adopted "…some form of free-market capitalism rooted in the principles of economic freedom have participated in an era of globalisation and economic integration that has fuelled unprecedented economic growth around the world" (Miller and Kim 2015).

Other economists including Robert Wade of the London School of Economics have also suggested that economies must be outward-looking and free from protection. Wade (1990) voiced his disapproval of state involvement in the following statement, "The key development policy is … an outward-oriented trade regime, characterized by low or negligible impediments to imports, relatively uniform incentives for different production activities, and incentives for export sale equal to the incentives for domestic market sale … In addition, by expanding the proportion of the economy … subject to international competitive pressures, the government's own ability to impose political prices is weakened; hence, producers' uncertainty about government policy is reduced" (Wade 1990).

The evolution of development theory from 'modernist' approaches incorporating stage wise processes and significant government involvement to a 'neoliberal' economic model that has led to the commodification of land and labour in favour of the market and economics has produced enormous 'global' wealth. Private enterprise, market freedom and policies that encourage entrepreneurialism have played, and continue to play, significant roles in national development programmes. Neoliberalism has immense potential to be of significant benefit to people living in impoverished nations and local and global environments. The neo-liberal revolution embedded the 'structural hegemony' of global capital, and extended ideas of neo-liberalism to an international setting (Gill and Law 1989). Hence, neo-liberalism became a blue-print for globalisation.

Globalisation

Globalisation is defined by the Oxford Dictionary[15] as being "The process by which business or other organisations develop international influence, or start operating on an international scale." It represents an extrapolation of the neoliberal model and has had, and continues to have, both positive and negative consequences for rich and poor nations. The impact of mathematical models and the imposition of policies from globalised economics-based forums like the G8[16] have encouraged developing countries to integrate into a global economy and to align their economic policies with those of developed nations. Application of these models seems to have

[15] Oxford Dictionaries can be found at https://en.oxforddictionaries.com/definition/globalization

[16] The Group of Eight (G8) was made up by government representatives from Canada, France, Germany, Italy, Japan, United Kingdom, United States and the European Union with Russia making up the eighth member. At the time of writing this thesis Russia had been suspended as a result of its annexation of the Crimean Peninsula. The G8/G7 is represented by the heads of state of each of the members who meet annually to discuss major economic and political issues facing their domestic societies and the international community.

been a double-edged sword. On one hand, entrance into the global economy can increase the dependence of developing nations on developed nations and therefore reduce the drive for independence of poorer nations (EC 2013). For example, global economic policies have encouraged some developing nations to produce goods and services for the global market while ignoring arguably better options for their own needs (Slocum-Bradley and Bradley 2010). On the other hand, the influence of neoliberal economics and globalisation on 'real world' gross domestic product has seen an increase of "…about 70 percent, and the global poverty rate has been cut in half, lifting hundreds of millions of people out of poverty" (Miller and Kim 2015). Global economic policies also offer a greater opportunity for interconnectedness, enabling organisations to operate more easily at an international scale.

'Making globalisation work for the poor' was the key theme of the Bretton Woods institutions, however, many contemporary development strategies may have more to do with 'global positioning' than with the management of the ''national household' (McMichael 2000). The Malaysian economist Shyamala Nagaraj suggested that the emergence of a global culture through a wide range of developments, including advances in global information and transport systems, supported the idea that global positioning was easier for nations with a technological advantage (Jomo and Nagaraj 2001). In particular, globalisation has been encouraged by developments in communication technology, which have enhanced our ability to access and transmit information, and through advances in the processing of information by computer (Jomo and Nagaraj 2001). In the modern economy, transnational corporations are becoming more politically influential at local, national, regional and global levels; pressure is applied by global markets for nations to participate in addressing the needs of the market, and often for individual nations to play a role regardless of their internal needs and conditions (Jomo and Nagaraj 2001).

Proponents of globalisation have suggested that the global economy is fundamental to global stability, and that the global market place affects organisations and societies in every nation (Vercic et al. 2002). However, the smooth running of the global market relies on there being a dominant economic power with a national currency that is accepted internationally as a unit of account, medium of exchange and a store of value. The USA and the US Dollar currently fulfil these roles (Jomo and Nagaraj 2001). Opponents of globalisation, however, see it merely as an extrapolation of the neoliberal economic model, criticisms of which can also be levelled at globalisation.

As defined earlier the concept of 'globalisation' does not relate only to economics, but also enhances the ability to communicate, move goods, provide services and have international influence. The continual increase in people's ability to operate and to have influence internationally supports expansive ideas and has made it easier for organisations like EcoCARE Pacific Trust to extend their areas of operation and to establish themselves in a range of locations. Thus, EcoCARE Pacific Trust has been able to expand its sphere of influence from initial operations in Tonga and to a lesser degree Samoa, Kiribati, Tuvalu, Tokelau and Fiji, to Norway (EcoCARE Norway) and the Ukraine (EcoCARE Ukraine) where branches that apply the Enpovigo philosophy and development strategy have been established. The ease with which EcoCARE is able to collaborate with partners overseas, procure competitive deals on hardware for projects from suppliers in Europe, the USA and Asia, negotiate tax and import exemptions, and travel to sites for research and/or installation of agreed upon resources are specific examples of the benefits of globalisation.

The Washington Consensus

Economic and financial crises in Latin American countries in the 1970s and 80s led to the development of policies deemed necessary for their recovery. The oil shocks of the early 1970s, easy availability of loans combined with increased borrowing by Latin American states, and arguably, inept fiscal management, left many nations owing many billions of US dollars primarily to US banks where 80% of Latin American debt was held (Sillitoe 1998a). In 1975 Latin American nations owed US$75 billion with US$12 billion/year being required to service the loans (Sillitoe 1998a). A decline in commodity prices and increasing oil prices, due in part to the Iranian revolution, resulted in the imposition of restrictions being implemented by the US Federal Reserve. These restrictions resulted in an increase in interest rates on loans from 9% in 1970 to 17% in 1981. By 1983 Latin American nations collectively owed US$315 billion and the cost of servicing loans was US$66 billion/year (Sillitoe 1998a). The rise in cost of debt servicing consumed 87% of new lending to Latin America and consumed 73% of new lending to Africa. By the early 1980s it had become clear that Latin American and African states would be unable to repay their debts.

In 1989 representatives of institutions based in Washington DC, including the International Monetary Fund, World Bank and the US Treasury, met to discuss how best to manage this difficult and economically volatile situation. John Williamson, an English economist, was involved in these discussions and coined the term Washington Consensus to refer to a general level of agreement on policy by major institutions that if implemented would make a significant contribution to the reform of the deeply indebted Latin American economies (Williamson 1993). Although the Washington Consensus as depicted by Williamson was spatio-

temporally specific, the term 'Washington Consensus' has morphed into what is now generally accepted as describing a strong, market-based neoliberal economic approach to development.

Williamson's original definition of the Washington Consensus incorporated ten principles:

1. Fiscal discipline should be maintained (budget deficits should not exceed 2% of GDP)
2. Public expenditure priorities should be re-ordered (reduction and elimination of state subsidies, prioritisation of education, health and infrastructure spending)
3. Tax reform (broadening of tax base; maintenance of 'moderate' marginal tax rates)
4. Maintenance of positive real interest rates (to discourage capital flight and increase savings)
5. Maintenance of competitive exchange rates
6. Trade liberalisation
7. Elimination of barriers to foreign direct investment (FDI)
8. Privatisation of state-owned enterprises
9. Deregulation of the economy
10. Enforcement of property rights

Changes to Williamson's version of the 'Washington Consensus' have been prolific and although his original version criticised the freeing up of markets that occurred during Ronald Reagan's presidential tenure in the USA and Margaret Thatcher's time as prime minister in the UK, modified versions supported market fundamentalism and the application of neoliberal philosophies.

Belief in the ability of the global market place to successfully manage and maintain economic benefits for all grew significantly amongst economists and politicians alike during the 1980s. Confidence that the market would address development issues was succinctly illustrated in the following statement by the British academic Colin Leys (1996), "It is hardly too much to say that by the end of the 1980s the only development policy that was officially approved was

not having one – leaving it to the market to allocate resources, not the state". At that time there seemed to be a general consensus among developed nations that globalisation would solve the world's economic woes, and to an extent that is true (Miller and Kim 2015)Thus, for countries that have an even moderate amount of economic freedom[17] a highly significant relationship is found between economic freedom and per capita GDP (Miller and Kim 2015). However, for many poorer states transitioning to free market economics has not been a simple matter of imposing policies that would benefit their activities to a point where they become successful 'economic actors' in the global market place. In practice, there have often been internal objections by the populations of poorer nations like the people of Oceania, African, South America, many of the Caribbean Island nations and Asia to name a few, regarding what they perceived to be forced and unwanted change (Dunne and Wheeler 2004, Escobar 2004, Borras et al. 2013, Jaumotte et al. 2013, LeBaron 2013). West Papua, which makes up about 24% of Indonesia's total land mass and includes vast tracts of tropical rainforest, immense oil and gas reserves and possibly the world's largest deposits of gold and copper that make it Indonesia's richest region provides one example (Elmslie 2017). Thus, since West Papua became a province of Indonesia in 1969 over five hundred thousand indigenous people have been killed (in massacres, assassinations and killing rampages) by Indonesian occupying forces (Elmslie and Webb-Gannon 2013). An extraordinary number of similar examples relating to under-developed nations can be found in the literature.

Post-development Theory

[17] According to the Index of Economic Freedom

Post-development theory arose in the 1980s and 1990s through the works of scholars like Arturo Escobar, Gustavo Esteva, Majid Rahnema, Wolfgang Sachs, James Ferguson, Serge Latouche and Gilbert Rist who expressed dissatisfaction with many post-WW2 development theories, activities and outcomes (Nustad 2001). Leading members of the post-development school argued that development was always unjust and never worked, and up to that point had clearly failed. It was suggested that development theory was the construct of academics acting alongside political and economic ideologies that had no real relevance to the plight of the poor (Nustad 2001).

Wolfgang Sachs, a leading member of the post-development school, suggested that "…the idea of development stands like a ruin in the intellectual landscape" and went on to state that "…it is time to dismantle this mental structure" (Dreze and Sen 1995). In his introduction to 'The Development Dictionary: A Guide to Knowledge as Power' Sachs (1992) suggested that the Truman model[18] of development, which emphasised production (economic development) as the key to prosperity and peace, was misguided to say the least and that industrialisation as a path to equality had instead, resulted in substantial increases in inequality (Sachs 1992).

Knut Nustad, a political and environmental anthropologist suggested that one of the issues that had arisen from contemporary development theory was that, "...a development process is always initiated with a specific goal in mind and, although developers portray themselves as 'facilitators', they still know where the process ought to be heading" (Nustad 2001). He went on to suggest that development must be based on the idea of trusteeship and that it should be de-politicised. Nustad considered that local knowledge was an imperative component of trusteeship,

[18] United States President Harry S. Truman's inaugural address on the 20th January 1949 when he said:
"We must embark on a bold new programme for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. The old imperialism — exploitation for foreign profit — has no place in our plans. What we envisage is a programme of development based on the concept of democratic fair dealing".

as were the inclusion of participatory research methods and a 'bottom up' approach. Escobar (1999) also maintained that the post-development school of thought should be concerned with the "…promotion of localised, pluralistic, grassroots movements".

Post-development theorists tend to be 'hard-nosed' and adamant about their feelings regarding development. Thus, many of them consider that 'development' is a farce and has been from its very beginnings in the 1949 speech by President Truman. However, their rejection of universal theories, and their inability to propose concrete alternatives, has left them open to significant criticism (Pieterse 1997, 1998, Seimiatycki 2005). Neverdeen Pieterse was particularly critical of their convenient disregard for the gains made by Asian 'Tiger' nations and of their romanticising of indigenous populations (Pieterse 2000).

Some authors (Grischow and McKnight 2003) even accused post-development theorists of offering solutions that were anti-capitalist, anti-modern and anti-development, and suggested that because post-developmentalists require particular conditions, they are as controlling as were the old colonial powers. These authors therefore considered that post-development theory picks up where colonialism left off. Despite many post-development theorists being abrasive in their criticism of earlier development philosophies I tend to agree with some of their criticisms. In particular, I sympathise with their comments regarding the lack of participation, collaboration and trusteeship involved during the 'developmental process', the political and economic motivators used by development programmes, and the lack of importance placed on local and indigenous knowledge (Nustad 2001) all of which are important considerations under the Enpovigo philosophy.

Postmodernism

Tirthankar Roy, Professor of Economic History at the London School of Economics and Political Science, stated that Postmodernism questions the economist's preconception that economic progress requires nations to discard tradition and culture. Thus, in 2003 he stated that "Postmodernism questions the possibility of narratives of 'progress' in the sphere of culture, a position that disagrees with economists' faith in economic progress in which cultural change plays a large role" (Roy 2003). Alexandros Koutsouris, Professor of Agriculture at the University of Athens concurred and suggested that instead of discarding tradition and culture, development programs should embrace them. The consequences of not doing so in his opinion are indicated in the following quote: "Diversity and respect for difference is of utmost importance in understanding gender relations and cultural strengths. If one does not draw on cultural values and communal ideals which are indigenous to cultures, development will not occur; or, if it does for a time, it will not be sustainable" (Koutsouris 1998).

Like 'Enpovigo', postmodernism questions truths that are applied universally (deBeer and Swanepoel 2000, Ungerer et al. 2002), it acknowledges the validity of culture, traditional knowledge and values by suggesting that knowledge relates to context (deBeer and Swanepoel 2000, Ungerer et al. 2002), and it supports the use of international communications technologies (ICTs) as tools that can enable the restructuring of global capitalism (Huesca 2001). Plessis and Steyn (2005) also noted the importance of understanding cultural diversity and cultural differences between undeveloped and developed nations that were providing aid and funding. They also expressed concern with respect to the likely long-term effects of imposed social change on indigenous knowledge and values. In contrast, some critics of postmodernism have

suggested it is meaningless and promotes a distrust of evidence and truth[19], while Chomsky suggested it has added nothing to analytical or empirical knowledge[20].

Alternatives to Economic Models

During the 1960s and 70s it had become apparent that economic prosperity should not be the sole goal of development, but rather it needed to be seen as a means to an end. Thus, despite economic growth of developing nations, poverty has not been eliminated. The non-sustainability of economically-biased development philosophies, and the inability of economic models to successfully address the needs of the poor, is not a new phenomenon, Adam Smith (1790), for example, discussed the ethical impasse that was either not recognized, or ignored, by the proponents of economic models of his day. The following quote from Smith (Smith 1790, Dreze and Sen 1995) clearly indicates that: "...classical authors were deeply concerned with the recognition that we have reasons to value many things other than income and wealth, which relate to the real opportunities to lead the kind of life we would value living. In the writings of Smith and Mill[21], and other classical political economists, there is much interest in the foundational importance of our ability to do things we value, so that they saw the freedom to lead valuable lives as intrinsically important-not merely instrumentally so".

The hardships imposed on people living in impoverished nations that had been subjected to economic impositions during the 1950s, 1960s and 1970s by 'first world' financial

[19] Dennett on Weiseltier V. Pinker in The New Republic http://edge.org/conversation/dennett-on-wieseltier-v-pinker-in-the-new-republic

[20] http://www.openculture.com/2013/07/noam-chomsky-calls-postmodern-critiques-of-science-over-inflated-polysyllabic-truisms.html

[21] John Stuart Mill was an English philosopher, political economist and civil servant of the nineteenth century who proposed individual freedom above state or social control.

organisations, the ever burgeoning world population, rapid industrialisation, widespread malnutrition, depletion of non-renewable resources and destruction and pollution of the global environment (Meadows et al. 1972) saw the emergence of a new cohorts of theorists and researchers during the 1970s and 1980s. These people moved away from viewing development as being related only to economics and were instead concerned with poverty, basic needs, personal freedoms, self-determination and environmental protection (Seers 1969, Myrdal 1970, Meadows et al. 1972, Streeten 1972, Easterlin 1973, Myrdal 1974, International Labour Organisation 1976, ulHaq 1976, Hicks and Streeten 1979, Streeten 1979, Sen 1981, Brundtland 1987).

In 1968 the 'Club of Rome' was founded by Aurelio Peccei (an Italian industrialist) and Alexander King (a Scottish scientist). It was formed in 1969 by a group of scientists, educators, economists, humanists and industrialists who had an over-riding conviction that "…the major problems facing mankind are of such complexity and are so interrelated that traditional institutions and policies are no longer able to cope with them, nor even come to grips with their full content" (Meadows et al. 1972). In 'Limits to Growth' the first report[22] by the 'Club of Rome' printed in 1972 it was suggested that if the present growth trends in world, industrialisation, pollution, food production and resource depletion continue unabated, the 'limits to growth' on this planet will be reached sometime within the next one hundred years. They also suggested that growth trends can be altered and that a sustainable and stable global ecology and global economy is possible. Furthermore, they considered that global equilibrium could be achieved whereby '…the basic material needs of each person on earth are satisfied and each person has an equal opportunity to realise his individual human potential". The Club's report

[22] Limits to Growth was a report based on a computer simulation of exponential growth of populations and economies in a world with finite resources.

concluded by suggesting that "…If the world's people decide to strive for this second out-come rather than the first, the sooner they begin working to attain it, the greater will be their chances of success" (Meadows et al. 1972).

In line with the Club of Rome's report the increasingly worsening state of our environment is well documented (Tivy and O'Hare 1982, Bunyard 1985, Brown et al. 1987, Brundtland 1987, Dixon and Fallon 1989, Beckerman 1992, Miltin 1992, Goldsmith 1997, Halme and Huse 1997, Jacobs 1997, Munasinghe 1999, Bax et al. 2003, Abadie 2011, Balbus et al. 2013), as is the significance of exploitation for economic gain (Bunyard 1985, Brundtland 1987, Griffith 1995, Goldsmith 1997, Jacobs 1997, Altieri and Rosset 1999, Bax et al. 2003, Avato and Coony 2008, Bourgouin 2011, Balbus et al. 2013, Gagern and Bergh 2013, D'Arcy 2014). The consensus view amongst present-day scientists is that current economy-based philosophies that demand continuing growth as a precursor to success are unsustainable (Desai 2009), and our current misuse and abuse of resources means that the Earth will be unable to support predicted levels of global consumption unless significant philosophical and cultural changes are made (Tivy and O'Hare 1982).

Max-Neef (1992) noted that, "Economics has worshipped efficiency, and on its behalf we have evolved from economies of scale to what I would like to call 'diseconomies of uncontrollable dimensions'. The economic efficiency of this process is incontestable and so is its power to pillage natural resources, its capacity to pollute and its contribution to the rise in heart attacks and hypertension". A few years later environmentalist and founding editor of The Ecologist magazine Edward Goldsmith (1997) highlighted a growing concern of many in the following statement: "By now, it should be clear that our environment is becoming ever less capable of sustaining the growing impact of our economic activities. Everywhere our forests are

over-logged, our agricultural lands over-cropped, our grasslands over-grazed, our wetlands over-drained, our ground-waters over-tapped, our seas overfished, and just about the whole terrestrial and marine environment over-polluted with chemical and radioactive poisons. Worse still, if that is possible; our atmospheric environment is becoming ever less capable of absorbing either the ozone-depleting gases or the greenhouse gases generated by our economic activities without creating new climatic conditions to which we cannot indefinitely adapt".

Modernists may have been right in saying that significant cultural change is required for successful development to occur. Ironically, it is our consumer-oriented, 'economic benefit at all costs' culture that has led to previously unrealised levels of extinction of species, apart that is, from the mass extinctions of the dinosaurs by volcanic and possible meteor-related activities (Barnosk et al. 2011). According to the majority of scientists who study the Earth's environment our planet is in a very precarious situation and the culture of consumption needs to change if the human race is to survive (Meadows et al. 1972, Tivy and O'Hare 1982, Bunyard 1985, Barbier 1987a, Brown et al. 1987, Brundtland 1987, Dixon and Fallon 1989, Beckerman 1992, Gladwin et al. 1995, Goldsmith 1997, Munasinghe 1999, Woodhouse 2000). The situation has been effectively summarised by Barnosk et al. (2011) who stated that radical and speedy changes to the Earth's climate have been the main contributors to mass extinction rates over the previous five mass extinctions. They also suggested that land modification and habitat loss, pollution and ecosystem abuse issues, associated with the speedy rate at which the Earth's climate is changing, are likely to be responsible for what could be the Earth's sixth mass extinction.

In 1983 the United Nations convened the World Commission on Environment and Development (WCED), commonly known as the Brundtland Commission. The commission was formed to investigate growing concerns regarding, "…the accelerating deterioration of the

human environment and natural resources and the consequences of that deterioration for economic and social development" (Brundtland 1987). With the establishment of this commission the UN acknowledged a general feeling of dissatisfaction with the inability and ineffectiveness of economic-based development models to provide sustainable development policies. Nevertheless, despite a great deal of condemnation and discussion, economic models continue to provide the underlying philosophy of many major international institutions such as the International Monetary Fund (IMF), the European Union, and the World Bank.

In general, projects that require economic outcomes are unlikely to pay much more than lip service to alternative theories and in doing so the projects are likely to clash with local traditions and communities, national, social and/or environmental concerns. For example, the Colombian sociologist Orlando Fals Borda described an incident that took place in the territory of Loba, Colombia, at the beginning of the twentieth century after US companies entered the region to establish cattle ranches without consulting local communities. One of the many practices that these companies introduced to the area was the use of barbwire, an apparently harmless material that nevertheless had great significance for the local population: “It is known that the foreigners were adamantly opposed to the communal use of lands, which was a substantial part of local cultural identity and the local economy. Moreover, the Americans introduced the use of barbwire (brought first to the country between 1875 and 1880), fostering its use as a rational and natural practice for agricultural production. This practice, however, was particularly upsetting to the peasants of Loba, whose rationality and survival logic was quite different; their irritation increased even more when they saw their communal lands and their customary paths crossed by the fences, supposedly in defence of the sacrosanct principle of private property” (Borda 1970).

Environment/Ecology-based Theories

For many indigenous peoples land is essential for the very existence of their communities. It is important, therefore, that we note a selection of the innumerable comments, statements and actions of some of their representatives. The Australian Aboriginal, Jeffrey Lee, could have become a millionaire by selling off the rights to his family's land to a French mining company but he decided not to do so. In turning down this opportunity Lee illustrated that from his perspective nature is more important than economic benefit. Instead, he approached the Australian Federal Government with an offer to incorporate the land into Kakadu National Park, stating that "When you dig 'em hole in that country, you're killing me," and "Money don't mean nothing to me. Country is very important to me" (Murdoch 2007). For Lee it was more important to protect sacred sites and burial sites in the country for which he was responsible than to obtain financial benefit from its sale.

Although humans now have a greater understanding of their environment and the issues that confront them than at any time in the past, it seems that the drive to destroy the environment in the name of economic gain has never been greater (Tivy and O'Hare 1982, Brundtland 1987, Redclift 1989, Beckerman 1992, Miltin 1992, Altieri and Rosset 1999, Munasinghe 1999, Woodhouse 2000, McCarthy et al. 2001, Bax et al. 2003, Shiva and Jafri 2003, Sachs 2004, Ihlen 2009, Frankel 2010, Borras et al. 2011, Poletti and Sicurelli 2011, Hoepner et al. 2012, Balbus et al. 2013, Sinani 2014). In fact it is the intention of most governments is to participate in the global market place, a process institutionalised through the signing of the General Agreement on Tariffs and Trade (GATT) and subsequently the World Trade Organization (WTO) (Goldsmith

1997). However, participation in the global market place, too often involves neglect of the environment as shown in the following quotation from Goldsmith (1997), "...increased trade is justified because it is seen to be the most effective way of increasing economic development, which we equate with progress, and which in terms of the world-view of modernism, is made out to provide a means of creating a material and technological paradise on Earth, from which all the problems that have confronted us since the beginning of our tenancy of this planet will have been methodically eliminated. Unfortunately, economic development, by its very nature, must necessarily further increase the impact of our economic activities on the environment".

Taiwan and South Korea are cases in point. These two Newly Industrial Countries (NICS) have in recent decades achieved remarkable economic growth rates, and are members of the Asian Tiger group of countries whose economic models are being touted as examples for all Third World countries to try and emulate (Boyle 2006). However, in the case of Taiwan, forests have been cleared to accommodate industrial and residential developments as well as plantations of fast-growing conifers. The virgin broadleaf forests that once covered the entire eastern coast have now been almost completely destroyed and the vast network of roads built to open up the forests to logging, agriculture and development, has caused serious soil erosion, especially in the mountain areas where whole slopes of bare soil have slid away (Goldsmith 1997). Although Taiwan is located in a humid subtropical region where one might expect to find significant supplies of freshwater, availability of water is at a premium. Over-drawing of ground water (up to 95%) for irrigation has resulted in salt water intruding into the ground water lens and because of large-scale deforestation less than 25% of runoff is able to be used. With an ever increasing population and worsening freshwater capacity Taiwan faces a very thirsty future (Rubinstein 1994).

The following comment by Max-Neef (1992) is also relevant to this discussion. "Contrary to what is stated in textbooks, the last link of the economic process is not consumption but the generation of waste". The massive amounts of waste generated by the Earth's cities that epitomise the model to which under-developed nations are supposed to aspire, and which aid and development funding is supposed to enable, was probably a surprising outcome for many economists who initially supported the economic growth philosophy of the early 1960s and 70s (Max-Neef 1992). Since the mid-1980s, disturbing reports of global warming, climate change, the extinction of rain forests, declining biodiversity and pollution of air and water have revived discussions about the 'limits to growth' (Bunyard 1985, Donnelly et al. 2004).

Since the beginning of the industrial revolution scientists around the world have been suggesting that more concern should be placed upon the impacts that anthropogenic actions have on local and global environments (Smith 1790, Brown et al. 1987, Beckerman 1992, Sachs 1996, 2002, 2004, Balbus et al. 2013). Nevertheless, many people did not initially believe that the cumulative effects of ongoing environmental abuse necessarily imply an immediate threat to humanity (Bossel 1999) and it was not until the 1980s when broad support for sustainability became evident amongst the wider community. As early as 1969, however, U Thant, Secretary-general of the United Nations concluded that from the information available we have ten years left in which to subordinate our ancient quarrels and launch a global partnership to curb the arms race, to improve the human environment, to defuse the population explosion, and to supply the required momentum to development efforts. He went on to suggest that if such global partnerships were not pursued then he feared that "…the problems I have mentioned will have reached such staggering proportions that they will be beyond our capacity to control" (Meadows et al. 1972).

In 1987 the Brundtland report introduced the notion of "sustainable development[23]", which would "…not diminish the life chances of future generations" (Brundtland 1987) and noted that interventions would be needed to achieve sustainable development, which must incorporate environmental, social and economic considerations. So far however, concepts of sustainability seem to have, had little impact (Szirmai 2005) despite scholars such as Myrdal (1974) continuing to question what he called 'growth fetishism', whereby benefits were accruing largely to small groups of elites in underdeveloped nations, while the poor continued to be poor.

Seers (1970) also criticised the narrow growth focus of economic models and asked, "What has been happening to poverty? What has been happening to unemployment? What has been happening to inequality? If all three of these have become less severe, then beyond doubt there has been a period of development for the country concerned. If one or two of these central problems have been growing worse, and especially if all three have, it would be strange to call the result "development", even if per capita income had soared".

Like Seers, Myrdal, Streeten, Brundtland and innumerable other authors I also am of the opinion that sustainable development is an holistic process not based purely on economics, one that needs to be fought on many fronts that includes many differing areas of expertise. However, believing this and doing it are very different propositions. Nevertheless, in an attempt to make progress in this area, which requires working with a multiplicity of often unrelated disciplines I

[23] According to the 'Oxford Living Dictionaries' sustainability is defined as being: the ability to be maintained at a certain rate or level and/or avoidance of the depletion of natural resources in order to maintain an ecological balance. Sustainable development is defined as being; economic development that is conducted without depletion of natural resources.

have been utilising differing aspects of two ecological theories; spatial scaling (Weins 1989, Delsol et al. 2017) and macro-systems ecology (Fei et al. 2016).

Human Development Theory (the human perspective)

As theories evolved and new theories were generated it became clear to some that the initial, economic perspective inadequately defined success and did not acknowledge the numerous significant issues that confront people of all nations. The 'poverty of isolation' meant that many development programs did not reach the people that lived in the poorer, more isolated communities and by the 1970s these economic models were coming under attack (Seers 1972, Myrdal 1974, International Labour Organisation 1976, ulHaq 1976). Authors like Mahbub ul Haq suggested that economic models did not address the numerous social and cultural issues that confronted these communities. He, like many others, believed that development should be focussed on the people of the nations as opposed to trade and economy.

Human development theory (HD) makes humans the main focus and uses ideas from different disciplines, such as ecology, sustainable development, feminism and welfare economics to name a few (Seers 1969, Sen 1981, Streeten 1984, Haq 1992, Rubenstein 2001). HD avoids normative politics and focuses on how social capital and instructional capital can be deployed to optimize the overall value of human capital in an economy. Amartya Sen and Mahbub ul Haq are two of the fore-most proponents of human development. Sen's work is focused on capabilities: what people can do. He has suggested that it is capabilities, rather than income or goods that determine their well-being. Haq believed that people, not the economy, should be the main focus of development policies and practices and like Sen suggested that economic success is a means

to achieving development not an end in itself. The basic purpose of development, according to Haq (1990), is to increase human choices and to provide opportunities for people to enjoy long, healthy and creative lives. Haq was instrumental in the formulation and construction of the Human Development Index (HDI), a human-focused measure of development pioneered by the UNDP in its Human Development Reports (Scharma 2006).

The Basic Needs Approach (BNA)

The 1970s were a transitional period for development theory. Although the Modernist approach was most prominent during this time, there was increasing and significant frustration at the non-humanist perspective of many modernist practitioners. The introduction of dependency theory and the economic oppression of poor nations by rich nations encouraged a search for better options. Thus, since the beginning of post-WW2 development activities, substantial economic growth of poor nations had not been realised and it was generally agreed there had been little reduction in poverty and living conditions (Hicks 1979). The Basic Needs Approach was one of the first attempts to measure poverty in under-developed nations.

During the 1970s a number of possible alternatives emerged including employment-focused, and rural development-oriented growth strategies, population redistribution with growth strategies and a basic needs approach (BNA). The BNA grew out of work being done by the International Labour Organisation's (ILO) World Employment Program (WEP) and became prominent after the 1976 World Employment Conference. Critically, the BNA development strategy attempted to determine the income required to support physical well-being (i.e., consumption of goods) and made employment, people and their needs the central themes for

discussions about development strategies (Streeten 1972, Jolly 1976, Hicks and Streeten 1979, Streeten 1979, Hicks 1997). Endorsements that emerged from the World Employment Conference in 1976 were precursors to the Human Development Approach and influenced programmes and policies that helped persuade multilateral and bilateral development agencies review their activities and target outcomes (Jolly 1976).

The strategy of the BNA relates somewhat to an article by Albert Maslow in the Psychological Review of March 1942 in which a hierarchy of five basic human needs[24] was promulgated. Subsequently, the concept of 'minimum needs' was developed in the 1950s and Pitambar Pant of the Indian Planning Commission played a significant role in the development of 'minimum needs'. The basic needs development strategy combined economic growth, productive employment creation and basic needs, and was supposedly, more employment-intensive, more equitable and more effective in fighting poverty (Emmerij 2010). Essentially, it shifted attention away from economic output maximisation to poverty minimisation (Hicks 1979, Hicks 1997). In a report to the World Bank, Streeten (1979) wrote that the objective of a basic needs approach was to provide opportunities for the full development of the individual, in contrast to widely accepted income and employment approaches. In his report Streeten challenged the view that development activities should focus on productivity and growth, and stated that they also needed to address "…self-determination, self-reliance, political freedom and security, participation in decision making, national and cultural identity and a sense of purpose in life and in work".

Significantly, the basic needs approach was the first development philosophy that attempted to make quantitative measurements of outcomes other than economic indicators

[24] Maslow's 5 human needs are: 1 physiological needs, 2 safety needs, 3 social needs, 4 esteem needs and 5 self-actualisation needs.

(Streeten 1984). Hence, the first tasks for researchers were to quantify national basic human needs, including food, housing and education requirements for a target year and for the 25 year period starting in 1975. Not surprisingly, if these needs were to be met, including those of the poorest 20% of the population, researchers concluded that rates of economic growth would have to increase unrealistically by historical standards and would need to average slightly more than 8% per annum over the 25 year period 1975-2000. East Asia[25], and later China and India, subsequently achieved such rates, but in the mid-1970s few authorities would have forecast the 'economic miracles' that lay ahead (Emmerij 2010). A few authors thought that a programme to increase capital asset, would benefit all (Ahulawalia et al. 1978), however, critics of the BNA suggested that promoting increased consumption by the poor would contribute to reduced levels of investment and savings in the economy (Hicks and Streeten 1979, Hicks 1979, Hicks 1997). Subsequently, critics believed that conventional development strategies offered higher investment, and consequently, higher incomes, whereas addressing the basic needs of the poor would result in the lowering of incomes (including welfare) for everyone.

The Capability Approach (CA)

Although, the capability approach is commonly attributed to Amartya Sen, thinkers like Aristotle and Confucius also spoke of the importance of individual freedoms and needs. In the 19th and 20th Centuries Adam Smith and Karl Marx, among others, mentioned similar philosophies (Sen 1981, Nussbaum 1998, Sen 1999, Nussbaum 2000). In addition to Sen, people like Hicks (1979), Streeten (1979) and others were referring to development that targeted "…self-determination,

[25] East Asia is made up of China, Hong Kong, Macau, Japan, Taiwan, South Korea, North Korea and Mongolia

self-reliance, political freedom and security, participation in decision making, national and cultural identity and a sense of purpose in life and in work" (Streeten 1979). The idea that capability can enhance choice, and that better choices can improve survival, is not a difficult conclusion to arrive at. Throughout time the human race has had to make choices that relate to the ever changing environment in which we have evolved. Learning how to successfully hunt and kill larger, more dangerous animals like mammoths, elephants, lions and so on, relied upon an ability to learn and to then make informed choices.

The CA suggests that the freedom to achieve well-being relates directly to what people are able to do and be, and thus the kind of lives they are effectively able to lead. The CA is generally conceived as a flexible and multi-purpose framework, rather than a precise theory of well-being (Sen 1999, Robeyns 2000, Sen 2006b, Qizilbash 2008). The open-ended and underspecified nature of the CA partly explains why the term 'capability approach' was chosen because well-being is by definition, multi-faceted. CA has two key elements: firstly, the capability of individuals constitutes the informational resource, or in the words of Sen (1985) "…a set of vectors or functionings, reflecting a person's freedom to lead one type of life or another" and secondly, development is understood in terms of functional capability or the ability to respond as freedom is achieved, progressively (Sen 1999).

Amartya Sen (1999) therefore argued for a broad concept of development focusing on the concept of freedom with economic growth, technological advance and political change, all to be judged in the light of their contributions to the expansion of human freedoms. The most important freedoms he listed included freedom from famine and malnutrition, freedom from poverty, access to health care and freedom from premature mortality. In a telling empirical example, he showed that urban African Americans had lower life expectancies than the average

Chinese person or inhabitants of the Indian state of Kerala, in spite of much higher average per capita incomes in the USA (Sen 1985, 1999).

According to Amartya Sen, freedoms are both ends and means. Thus, markets can be engines for economic growth (means), but they constitute important freedoms in themselves, namely freedoms to exchange or transact (Sen 1999, Robeyns 2000, Sen 2006a, Qizilbash 2008). One important area where freedoms have frequently been restricted is in the labour market, where slavery, serfdom or other institutional arrangements can restrict the free movement of people. Political freedoms can contribute to economic dynamism, but are also goals in themselves (Sen 1981, 1999). Sen argued, somewhat optimistically, that all freedoms were strongly interconnected and therefore reinforce each other, but he tended to underemphasise clashes between freedoms of different groups of people and the value choices that still needed to be made (Sen 1985, 1999).

Because there is no precise definition of development, there are differences of opinion about its goals, including that of freedom, which may not be the ultimate goal from a variety of religious perspectives. Nevertheless, Sen's use of the concept of freedom as a normative yardstick for development is insightful. Although he considered economic growth to be important, he viewed its importance in terms of its potential contribution to a wide range of freedoms. Furthermore, changes in other spheres such as education and health can be at least as important as economic growth in the expansion of freedoms (Szirmai 2005). Ingrid Robeyns, 8th president of the Human Development and Capabilities Association, also saw the core characteristics of the CA to be a "…focus on what people are able to do and to be; that is, on their capabilities" (Robeyns 2007).

The capability approach encourages us to look at what resources are available to a person or community and the capacity of that person or community to benefit from those resources (Sen 1999, Gasper 2004). Adding to Amartya Sen's (1999) suggestion that a person's capabilities are "…the substantive freedoms he or she enjoys to lead the kind of life he or she has reason to value", Nussbaum (2000) included happiness, which he defined as "the life a person has reason to value", as a goal that could be achieved through CA. Interestingly, a major criticism of the capability approach has come from Sen himself (Sen 2006a) as he recognised that in a CA society, theorists and/or researchers judge what is best for the people, and in doing so, restrict their liberty to choose. Professor Robert Sugden, School of Economics, University of East Anglia, UK, in a thoughtful assessment of Sen's capability approach agreed with this assessment.

The capability approach is arguably the most important philosophy influencing the makeup of Enpovigo. Thus, the building of capabilities is essential for the attainment of freedom, a defining component of Enpovigo. A subtle difference between the capability approach and Enpovigo, however, lies in the absolute freedom that participants operating under the latter have in project selection and in the operational development strategies.

Participatory Development (PD)

Participatory development has similarities to the capability approach by emphasising the need for local peoples to be involved in the planning and undertaking of development. Thus, in the 1970s theorists such as the Brazilian educator and philosopher Paulo Freire suggested that without the involvement of oppressed people themselves in the design and implementation of development activities, populations and nations oppressed by poverty would remain isolated from the donors,

or in his words, were being offered “false charity” (Freire 1970). Exclusion of impoverished populations from consultation on development reinforced feelings of separation and the perception of ‘them’ and ‘us’ and perpetuated feelings of oppression and disenfranchisement. Inclusion on the other hand can enable equality and ownership.

Objections to the views of people like Freire came from many quarters and have been debated over time. Davies Gilbert a British Tory MP and past-president of the Royal Society opposed mass education and when the ‘Parochial Schools Bill’ was debated in 1807 he commented that "However specious in theory the project might be of giving education to the labouring classes of the poor, it would be prejudicial to their morals and happiness; it would teach them to despise their lot in life instead of making them good servants in agricultural and other laborious employments; instead of teaching them subordination it would render them fractious and refractory as was evident in the manufacturing counties; it would enable them to read seditious pamphlets, vicious books and publications against Christianity; it would render them insolent to their superiors and in a few years the legislature would find it necessary to direct the strong arm of power against them” (Freire 2000, Gasper 2006). Nevertheless, attitudes had changed by the 1970s when the inclusion of local participation in the design and implementation of development programmes was a significant element of the basic human needs approach.

Prior to the advent of community-based approaches to development activities, local communities were viewed primarily as targets for poverty reduction. However, the development of participation saw local communities as assets and partners. Jennings (2000) commented that “Participation is involvement by a local population and at times, additional stakeholders, in the creation, content and conduct of a programme or policy designed to change their lives. Built on a belief that citizens can be trusted to shape their own future, participatory development uses local

decision making and capacities to steer and define the nature of an intervention". Although a number of donor organisations agreed that communities should be involved in identifying needs and determining what programmes might be implemented, there was less agreement with regard to the extent of that involvement and whether participation was required throughout a development programme (Jennings 2000).

Participatory development acknowledges the importance of the individual and the community in decision making, and in doing so leads towards self-determination. That the PD approach can be successful is illustrated in this passage from Jennings (2000) "Four separate studies of participatory programming have found that such methods often cost less in the long run and are consistently more effective at getting assistance where it needs to go. Such methods were also found to be unmatched in fostering sustainability, strengthening local self-help capacities and in improving the status of women and youth. Finally, by establishing platforms where organisations may access and involve citizens in their programmes, participatory development methods often extended the reach of traditional development approaches by leveraging local resources with national and foreign assets."

Other writers have also suggested that by involving local communities, development activities are able to include and benefit from community-based social and human capital as participatory resources, and importantly, have emphasised that local knowledge is a primary requirement for success of development programmes (Mohan and Stokke 2000, Mohan 2001).

Criticism of PD has often focussed on the 'tokenism' and 'lip service' that has been paid to development-related fund applications and activities by development organisations in order to fulfil requirements that are insisted upon by major donor institutions. For instance, Mohan

(2001) noted that "As PD has become popular, some agencies use the rhetoric of participation with only limited empowerment. These organisations probably do this in order to gain funding or legitimacy". Furthermore, he suggested that "... many agencies use it [PD] uncritically and treat it as a 'rubber stamp' to prove their participatory credentials."

Debate over how best to elicit a community's consensus regarding development activities can also result in defining 'consensus' in ways that may be inappropriate. Thus, some authors such as Mohan (2001) have suggested that PD has treated communities as socially homogeneous. More bluntly, Cleaver (1999) stated that: "…despite significant claims to the contrary, there is little evidence of the long-term effectiveness of participation in materially improving the conditions of the most vulnerable people or as a strategy for social change".

Sustainable Development (SD)

Since the industrial revolution, nations privy to advancing technologies have been able to adjust and manipulate their environments to a point where they are less reliant on external influences to support their continued existence. Furthermore, since the late 1800s nations have negotiated hundreds of international legal agreements or International Environmental Agreements (IEAs)[26] in an attempt to address environmental problems they were unable to resolve themselves (Mitchell 2003). Despite the recognition of environmental issues that could potentially have negative impacts on human populations, but primarily because of lengthy response times,

[26] The primary stated purpose of IEAs is supposedly to manage or prevent human impacts on natural resources. As of 2003 there were over 700 multilateral IEAs. Several IEAs were already signed by 1900, and agreement adoption has increased steadily to the point that currently an average of over 20 Multilateral Environmental Agreements and 30 Bilateral Environmental Agreements are signed each year. An initial focus on species protection has increasingly recognised concern with pollution and habitat protection (Mitchell 2003).

sustainability of the human race was not seen to be a problem and little action was taken on environmental issues. However, in part because of our past inability to fully appreciate and understand the impacts of ever-advancing technologies, economies and population growth, many commentators now believe that sustainability of the human race is threatened (Bossel 1999).

Growing public concern for the state of the environment came to a head in the 1980s, and the concept of Sustainable Development (SD) also came to the fore in political discussions during that decade. In part, these environmental concerns and the need for a sustainable environment were catalysed by the Brundtland Commission of 1987 and are illustrated in the following extract from the Commission's report, "…when the century began neither human numbers nor technology had the power radically to alter planetary systems. As the century closes, not only do vastly increased human numbers and activities have that power, but major, unintended changes are occurring in the atmosphere, in soils, in waters, in plants, in animals and in the relationships among all of these". The report went on to state that "… it deeply worries many ordinary people who are seeking ways of placing those concerns on political agendas" (Brundtland, 1987).

Sustainable development was the main theme of the Brundtland report but over time the concept and definition of sustainability has morphed into almost unrecognisable forms that refer to many aspects of human society as illustrated by Norgaard (1988), "Environmentalists want environmental systems sustained. Consumers want consumption sustained. Workers want jobs sustained. Capitalists and socialists have their 'isms' while aristocrats, autocrats, bureaucrats and technocrats have their 'cracies'. With the term meaning something different to everyone, the quest for sustainable development is off to a cacophonous start."

So how should ‘sustainable development’ be defined? The word sustainability has its origin in the Latin sustenere (tenere, to hold; sus, up) and dictionaries provide numerous meanings for sustain, the main ones being to ‘maintain’, ‘support’, or ‘endure’. The Oxford Dictionary defines sustainability as being the ability to “…be maintained at a certain rate or level” and as “…conserving an ecological balance by avoiding depletion of natural resources”. However, as indicated above, the term “sustainability” has found its way into a multitude of other applications and aspects of life, each offering its own perspective, and not infrequently with its own definition of development too. Some of these perspectives are illustrated by the quotations below.

Pearce et al. (1989) suggested that sustainable development “…requires policies that enable future generations to have at least as much wealth (or stock of assets) as the present generation received” (Pearce et al. 1989). Pezzey (1990) described sustainable development as being when “...welfare is above some minimum level and that growth is economically sustainable; that utility is non-declining (utility is defined as a function of consumption and the state of the environment); or that utility is non-declining and consumption is greater than the minimum necessary to satisfy basic needs and below a maximum which define ecological stability”(Pezzey 1990). Barbier (1987) suggested that sustainable development simultaneously maximises “...the biological system goals (genetic diversity, resilience, biological productivity), economic system goals (satisfaction of basic needs, enhancement of equity, increasing useful goods and services), and social system goals (cultural diversity, institutional sustainability, social justice and participation)” (Barbier 1987b).

Similarly, Viederman (1994) defined sustainable development as; “...a participatory process that creates and pursues a vision of community that respects and makes prudent use of all

its resources – natural, human, human-created, social, cultural, scientific. Sustainability seeks to ensure, to the degree possible, that present generations attain a high degree of economic security and can realise democracy and popular participation in control of their communities, while maintaining the integrity of the ecological systems upon which all life and all production depends, and while assuming responsibility to future generations to provide them with the where-with-all for their vision, hoping that they have the wisdom and intelligence to use what is provided in an appropriate manner" (Viederman 1994).

A common theme in these attempts to define 'sustainable development' is the maintenance of ongoing benefits and the continuing availability of resources into the future, regardless of whether resources are economic, human, technological, or natural. The ongoing sustainability of development programs, the environment, economic activities, technologies, governance, public services and so on, play a vital role in any discussions regarding programmes or activities that encompass the Enpovigo development strategy, making 'sustainability' a vital component in programme selection and strategies.

Gender-based Approaches to Development

In the early days of contemporary development theory, researchers assumed that male and female roles in undeveloped countries were similar to those found in traditional European and North American households where the man was the main 'bread winner' and the woman would stay at home, have babies, clean and cook (Hunt 2008). As early as 1929, however, women in Nigeria protested against such categorisation because it reduced their position in society by removing their ownership of land (Mies 1986). Many development projects did not recognise the

diversity of roles played by women in society, resulting in a worsening of women's roles by "…depriving them of land which was taken over for the development project's crops, denying them access to technical assistance, providing resources, training and education to men, and often, unknowingly, adding to women's work burden...creating wider inequalities than already existed" (Hunt 2008).

The perspective of women's roles as primarily those of mothers and homemakers started to change with the publication of Ester Boserup's paper 'Women's Role in Economic Development' (Boserup 1970). Emergence of the Marxist feminist movement in the 1980s and 90s added to the changing perspective by espousing that the "…accumulation of capital resulted not simply from the exploitation of peripheral countries, but from the free subsidy of women's unpaid reproductive and subsistence labour" (Hunt 2008). The German sociologist and feminist Maria Mies expanded on this theme and suggested that "…capitalism could not spread without the subjugation and exploitation of women" (Mies 1986).

Almost two decades later the World Bank acknowledged the importance of gender equality when it reported that "There is now a shared understanding within the development community that development policies and actions that fail to take gender inequality into account and fail to address disparities between males and females will have limited effectiveness and serious cost implications" (World Bank 2003a). Subsequently, the 2014 report on 'The World survey on the Role of Women in Development' concluded that the predominant development patterns still featured entrenched gender inequalities and were unsustainable with respect to many of the issues surveyed, including economic growth and work, population and reproduction, food and agriculture, water, sanitation and energy (UN 2014).

Today, gender inequality remains a significant issue and as recently as 2017 only Iceland was preparing to pass a law making it the responsibility of employers to prove that men and women were receiving the same pay for the same work or fines would be imposed (Guardian 2017). Although the concept of gender equality has had significant support from many European states and the World Bank, lobbying by the Vatican, conservative Islamic states and the anti-abortion lobby in the USA have forced many policy makers to marginalise emphasis on gender equality and to drop the United Nations Millennium Goal to significantly improve the reproductive health of women altogether (Hulme 2009).

From the beginning gender equality, and equality in general have been significant concerns of programmes designed and undertaken through EcoCARE Pacific under the philosophy of Enpovigo and have been important considerations in programmes focussing on access to education, including scholarship eligibility and access to technology. Notably, of the two fully funded, University of Canterbury, College of Science Pacific Scholarships, both were awarded to female high school students because they were best qualified under the selection criteria (see Chapter 5). However, it is difficult to know whether gender issues play a role in other non-EcoCARE projects that have been implemented in remote island communities where women's rights are not the same as those of men.

Information Communications Technologies (ICTs) for Development

The founding fathers of academic research into the potential influences of communications on societies, politics and circumstances were Kurt Lewin (1890-1947), Paul F. Lazarsfeld (1901-1976), Harrold Lasswell (1902-1980) and Carl Hovland (1921-1961). However, it was not until

Wilbur Schramm's work on the use of communications for developmental purposes in the 1950s and 60s that communications research gained credibility (Schramm 1964, Singhal 1987). Schramm (1964) suggested that as "…economic activity spreads the act of balancing and sharing the strain ... it requires quicker reports from farther away and quicker orders to more scattered centres...[and]... knowledge must be gathered more broadly and shared more widely". He also noted that "...we must share information, we must share it widely...for development to occur". Compared with now, communications technology had huge limitations in Schramm's time and it was unable to deliver the sorts of outcomes he proposed.

In contrast to the situations of people living in poor under-developed nations, the opportunities for people who live in rich nations to communicate with each other and access information has never been greater. Many researchers and commentators therefore believe that information and communications technologies have the potential to offer under-developed nations a way forward (Schramm 1964, Clemons et al. 1993, Annan 1998, Avgerou 1998, Mansell 1999, Adeya 2002, Heeks 2002, Harris 2004, Pichon et al. 2004, Brewer et al. 2005, Qureshi 2006, Fuchs 2008, Bingimlas 2009, Duncombe and Boateng 2009, Monahan 2009, Assar et al. 2010, Blake and Garzon 2010, Gholami et al. 2010, Grönlund and Wicander 2012, Ryu 2014). The development of computers and mobile phones has revolutionised information access and transfer through the internet and via intranets, while the 'unbiased' nature of information means that it does not select for gender, economic status, religion, colour, political or sexual preference. As one might expect, it is not difficult to find journal articles and books that proclaim the potential benefits of information and communication technology (ICT) in the pursuit of development through their ability to support information transfer (Singhal 1987, Annan 1998, Avgerou 1998, Steinmueller 2001, Adeya 2002, Gerster and Zimmermann 2003,

Suoronta 2003, Chan et al. 2005, Dahlman and Utz 2005, World Bank 2005, WB 2006, Ekaputri 2007, Fuchs 2008, Stapleton and Garrod 2008, Whelan 2008, WB 2009, Assar et al. 2010, Blake and Garzon 2010, Silva and Westrup 2010, Union 2010b, a, Bouras et al. 2011, Byrne et al. 2011, Egypt 2011, Geldof et al. 2011, Wikan and Molster 2011, Thapa and Sæbø 2014).

Proclaiming the potential for success is vastly different from the reality, however. Thus, it is also not difficult to find journal articles and books that complain about the lack of success of programmes that have implemented significant ICT infrastructure into third world communities (Bloom and Rosovsky 2000, Adeya 2002, Ekdahl and Trojer 2002, Heeks 2002, Gerster and Zimmermann 2003, Kauffman and Kumar 2005, Miranda et al. 2006, Bekker 2007, Bingimlas 2009, Harris et al. 2009, Brown and Grant 2010, Chochliouros et al. 2010b, Chochliouros et al. 2010a, Bala 2011).

Nevertheless, even if ICT has not always been successful in the past, current technologies offer a potential solution to the 'poverty of isolation' faced by remote island communities and they play a fundamental and essential role in the Enpovigo development strategy. How Enpovigo is able to enable and support ICT usage in remote island communities is elaborated on in Chapter 4.

Indigenous Development Theories

Often those who live and work in westernised, developed or emerging nations assume that the western development models and theories are the only options available when wishing to participate in the development of impoverished or under-developed nations. Very few articles and/or books describing or analysing the remarkable growth of the Indian and Chinese

economies and their associated development philosophies are available. Even fewer works deal with indigenous development philosophies, one exception being the book 'Non-Western Theories of Development' edited by (Wiarda 1999).

Under Confucian tradition, all human beings are created intrinsically equal. However, human relationships are hierarchical in nature, i.e., through age, sex, family relationships, political and/or social status. Personal development is an essential part of the acceptance of a Confucian life style so Confucius was able to state that "…by the time he turned seventy he could follow his heart's desire without departing from the correct path" (Wiarda 1999). Under Confucianism, political authority is instituted by 'heaven' for the people's benefit, a belief that still plays a significant role in the governance and policy making of China. Seemingly in contradiction with the current modernist/neoliberal, market driven model, which suggests that the market will drive development, China has become the second largest global economy under state control while retaining traditions that are frowned upon by 'modernist' philosophies.

Unsurprisingly, many nations have their own development philosophies that relate to their particular situations and cultures (Sillitoe 1998b, Wiarda 1999, Blackmore 2007, Lauer and Aswani 2009, Chaudhry et al. 2014, Hadi et al. 2014). For example, Sardar (1996) suggested there were seven essential features that development within an Islamic society should address: human resource development, expansion of useful production, improvement in the quality of life, balanced development in different regions of the country, evolution of indigenous technologies, reduction of national dependence on the outside world, and greater integration with the rest of the Muslim world. Regardless of where knowledge comes from it is important to recognise the significance of other cultures and their understanding of local conditions and requirements.

Under Enpovigo all information is valuable, be it contemporary, indigenous or traditional knowledge, and can be used as applicable in development programmes.

Concluding comment

As indicated in the introduction to this chapter a plethora of development theories have been generated during the modern era (1940s to the present day). In addition to having an economic focus some of these development theories have addressed human rights, human and food security, sustainability, gender issues, the basic needs and evolution of capability in under-developed nations and many other things. Aspects of post-modernism, the continuing evolution of neo-liberalism, and people-centred approaches to development remain significant today, and the pursuit of happiness is seen by some as a development goal in its own right. In this thesis I have chosen to focus on prominent, influential and current theories, especially those that are most relevant to a new development model Enpovigo that provides the philosophical basis for the development programmes that are central to this thesis.

Various aspects of many of the theories discussed in this chapter have at least some applicability to the makeup of 'Enpovigo' and are expanded upon in Chapter 4. Some like the capability approach and participatory approach to development have significant impacts on how EcoCARE goes about development projects, including its attempts to impart sustainability into chosen projects during their implementation. The ability to use technologies which support communications, information access and knowledge is a fundamental requirement if individuals and communities are to obtain relevant capabilities, and are able to choose and participate in development-related activities that fit within their specific contexts.

In his book ‘Development Dichotomies’ Paul Streeten stated that we need to strengthen our understanding of the “…historical dimension, so that we understand how things came to be what they are, [and] so that we may know the limits of, and opportunities for, desirable change”. His statement “how things came to be what they are” encompasses the changing attitudes of developers and theorists as outlined in the present chapter, and is particularly relevant to the subject of the next chapter which looks at how development funding is allocated and for what purposes.

Chapter 3. Financing for development

Introduction

In the previous chapter I discussed the evolution of development theory from the time of World War 2 to the present day and identified theories that have influenced the development of Enpovigo, which underpins the development activities of EcoCARE Pacific. Enpovigo addresses human needs and draws on theories of capability, participation and sustainable development as well as environment-based and cultural approaches. It stresses the fundamental importance of information and access to knowledge if individuals and communities are to participate in development-related activities that fit their unique contexts.

In the present chapter the reader is introduced to the principal financial organisations and institutions that offer much of the funding for international development and their underlying philosophies are discussed. International Governmental Organisations, Non-governmental Organisations and Multinational and Transnational Corporations are discussed and their functions and modes of operation examined. A broad understanding of how the major funders operate, and have done historically, is important because they are in a very strong position to influence development practices. Obviously, EcoCARE Pacific Trust is a very small player on the international scene, and its funding model differs significantly from those of the major players. Nevertheless, small NGOs can make valuable contributions that improve the well-being of underdeveloped communities and enhance the lives of individuals as demonstrated in Chapter 5 of this thesis.

Over time, development strategies have evolved and new ones have been generated as discussed in Chapter 2. These have included free market economic models of the neo-liberal movement and various alternatives to purely economic and market-driven programs. Although a number of politically, socially and environmentally focused development and aid programs were established in the 1970s, economic growth continues to be the main targeted outcome of most developmental programs today. Consistent with this emphasis, most organisations that handle development funds use economic indicators as the principal determinants of a project's success, despite providing little information on what impact they may have had on communities in developing nations (Sen 1992, Escobar 1995, Sen 1999, 2000, Kanbur 2005)

The modern era of international development began after World War 2 when nations severely impacted by the devastation of war were trying to recover their markets and infrastructure. Reasons why countries and organisations have become involved in development funding are various and have included the need to pay for the 'sins of the past', as was the case of the "Axis" nations[27], post-colonial nations that were left impoverished by their previous colonial rulers, to open up new markets, and to provide aid for human needs and sustainable development. The plight of the world's poor and the role that 'big push[28]' type programs play in development were highlighted as being successful pathways to development by Jeffrey Sachs (2005) in his book "The End of Poverty".

In this chapter I discuss the European Union funds for development (the EDF), the United Nations Development Program, the Bretton Woods institutions, including the World Bank, the International Monetary Fund and the BRICS Development Bank (now known as the

[27] Germany, Italy, Japan and their allies in World War 2
[28] 'Big push' approaches to development (promoted by Jeffrey Sachs) and their opposites, 'piece meal' approaches (promoted by William Easterly) are elaborated upon in Chapter 2.

New Development Bank). A more recent trend is for development funding to come from transnational and multinational corporations (TNCs and MNCs), and huge numbers of large and small non-governmental organisations (NGOs) have also become involved in delivering aid of various kinds to impoverished and undeveloped communities in many parts of the world. Most NGOs active in international development are involved with humanitarian assistance and poverty alleviation and often have a community or environmental focus (Werker and Ahmed 2008). They may be involved in the provision of education, housing, sanitation, the provision of clean water, food and other basic needs and are typically funded by donations and dependent on volunteers. (Wegner 1993, Nonprofitaction 2015). EcoCARE Pacific is a small NGO with strong ties to the University of Canterbury, whose staff and students have participated in development programmes using their expertise for the benefit of communities in the Kingdom of Tonga. It has involvement in humanitarian programmes with emphasis on education, communication and health issues and the development of capabilities in local communities. A detailed account of these programmes and the ways they are funded is the focus of Chapter 5 of this thesis.

The Treaty of Rome and European Development Policy

To many observers a pivotal point in the formation of what today is known as the European Union was the Hague Congress in 1948. This event led to the creation of the European Movement International, and the formation of the College of Europe, a place where the future leaders of Europe could live and study together (Mahncke et al. 1999). The subsequent formation of the European Coal and Steel Community in 1952 represented a step towards a formal collective of post-war European nations, and in 1957 Belgium, France, Italy, Luxembourg, the

Netherlands and West Germany signed the Treaty of Rome[29]. This agreement saw the formation of the European Economic Community (EEC), the European Atomic Energy Community (EURATOM) and the European Development Fund (EDF), which is the EU's main instrument for providing development aid to African, Caribbean and Pacific (ACP) countries and overseas countries and territories (OCTs). Establishment of the EDF helped facilitate a generally acceptable method of funding development assistance from the European Union and avoided financing it from the general budget of what is today, the EU (Broberg 2013). It is managed by the European Commission and the European Investment Bank. The Fund typically runs for a period of about 6 years and is then replaced by a new one; the present EDF is the eleventh (Herrero et al. 2015).

European development policies dating back to the Treaty of Rome made the European Union an international leader in the formation of development agendas (Holland 2002, Holland and Doidge 2012). At the signing of the Treaty of Rome the European Economic Community, which later became the European Community, and then the European Union, several member states remained as colonial powers (Holland 2002, 2008, Broberg 2013). Development policy was included late in the negotiations of the Treaty of Rome by France and was designed with reference to former colonial nations to "ensure the development of their prosperity in accordance with the principles of the Charter of the United Nations" (Frisch 2008). A number of member states remained colonial powers at the time of the signing of the treaty and they insisted that the European Union retain and maintain permanent relations with them (Holland 2002, Broberg 2012, Holland and Doidge 2012, Broberg 2013). Initially, OCTs were given 'association status'

[29] The signing of the Treaty of Rome (also known as the Treaty on the Functioning of the European Union) was instigated primarily by France and Belgium ((Holland 2002, Gavas 2012b, Holland and Doidge 2012, Broberg 2013))

under Part IV of the Treaty of Rome[30] meaning that their products would receive reciprocal customs duties and free access to markets within the European Union. The OCTs were also eligible for development assistance from the European Union. Although there has been great pressure from some organisations including the World Trade Organisation (WTO) and the G7 to remove preferential market access, market access and economic development assistance continue to be the main pillars of European Union development policy (Broberg 2013).

The EU maintains a desire to support the development needs of poorer nations, in particular the ACP group of nations, funding coming from the EU and its members. Thus, Slocum-Bradley and Bradley (2010) stated that the "…EU Treaty obligation on sustainability has an over-arching commitment to promote economic and social progress and a high level of employment and to achieve balanced and sustainable development." With a relatively large population, an economy of global significance and military resources, the European Union, EU institutions and the EU member states provide over half of all development aid, with €56.2 billion being dispersed in 2013 (Herrero et al. 2015). Nevertheless, despite being the world's largest provider of Official Development Assistance, the EU it has been criticised for not punching its weight on the international stage in the foreign and security areas, and for the inability of its executive, the European Commission (EC), to address the 'policy-to practice gap'.

Yaoundé Conventions (1964-1975)

[30] Currently, 'association' of a country implies that it is being considered for entry into the European Union, but in those days it meant "the non-European countries and territories that had 'special relations with Belgium, France, Italy and the Netherlands' (Article 131 of the Treaty of Rome).

The first Yaoundé convention was created under the philosophical umbrella of Modernisation theory and was signed in Yaoundé, Cameroon between the ECC and the Associated African States and Madagascar (AASM) in 1963. It and its successor Yaoundé II focused on trade as a mechanism for generating foreign exchange, which would then be invested in local processes of industrialisation that supported the Rostowian take-off model (Herrero et al. 2015). The conventions took place in a climate of decolonisation and redefined relationships between the European Union and recipient nations prescribed under the Treaty of Rome (Holland 2002, Broberg 2013). Yaoundé I and II supported continuation of the EDF format for OCTs with the establishment of EDFs II and III. Whereas the Treaty of Rome viewed OCTs as being subordinate to, and dependent upon, the EU, the Yaoundé conventions negotiated with OCTs in a spirit of equals and sovereign partners (Noor-Abdi 1997, Broberg 2013). Thus, equality and reciprocity underpinned negotiations between the EU and OCTs. Free market access and trade negotiations remained firmly embedded in EU development policy during the time of the Yaoundé Conventions (Bartels 2005, Broberg 2013).

Lomé I and II (1975-1985)

The Lomé conventions were trade and aid agreements between the EEC and 71 African, Caribbean and Pacific (ACP) countries, the first of which was signed in Lomé, Togo in 1975. The first Lomé convention recognised the emergence of dependency theory which was critical of modernisation and questioned the integration of developing countries into the capitalist system (see Chapter 2). The experience of Yaoundé identified that the modernist model failed to alter the core-periphery relationship and was accused of being simply an extension of French colonial

rule (Broberg 2013). Lomé hoped to address the philosophical errors of judgement presented in the Yaoundé conventions by broadening the EU's point of view; the introduction of the United Kingdom (UK) into the EU in 1973 helped to achieve this. A pre-condition of the entrance of the UK into the EU was that its former colonies should be offered 'association status' (Broberg 2013).

According to Broberg (2013) Lomé I introduced non-reciprocal trade agreements with ACP and STABEX (Système de Stabilisation des Recettes d'Exportation) and special aid to LDCs. Lomé I also introduced the idea of equality, which was reflected in the establishment of three permanent institutions: ACP-EU Council of Ministers, the Committee of Ambassadors and the Consultative Assembly. These institutions remain and provide the most influential methods of governing EU/ACP relationships (Broberg 2013). ACP exporters of bananas, sugar and beef gained preferential access to EU markets, the Beef and Veal Protocol providing a tax refund for ACP exporters (Broberg, 2013).

In 1980 Lomé I was replaced by Lomé II, which covered the period 1980-1985. Lomé II added the SYSMIN (System of Stabilization of Export Earnings from Mining Products) to assist with ACP mineral exports During this period, however, developing countries in Asia and Latin America continued to receive neither trade preferences nor association status (Broberg 2013).

Lomé III and IV (1986-2000)

European development policy between 1986 and 1990 was primarily regulated by Lomé III and from 1990 to 2000 by Lomé IV. Lomé III and IV expanded on areas of non-reciprocal trade and development aid of previous agreements, with among other things "…cultural cooperation,

environmental protection, support for structural adjustment, and the question of debt relief" (Broberg 2013). During this period the EU development policy supported increasing involvement of the private sector and de-centralisation that involved the developing nations taking greater ownership of policies and strategies (Broberg 2013). Included in the pre-amble to the Lomé III Convention and Article 5 of the Lomé IV Convention was a statement that democracy, human rights and the rule of law were requirements of developing nations in their relations with the EU.

Although, Noor-Abdi (1997) and Holland (2002) questioned the value of the inclusion of provisions for rural development, health, and cultural and social cooperation in EU development policy, Broberg (2013) commented that "Lomé III did reflect a shift in attention from the promotion of industrial development towards a focus on food security, prevention of desertification and drought, rural development and the principles of self-reliance and self-sufficiency". Latin American and non-European states that bordered the Mediterranean Sea found relevance within the EU in 1986 when their old colonial masters, Portugal and Spain became EU member states. During the same period India and Pakistan were offered broad development agreements, as were the Association of South-East Asian Nations (ASEAN), Indonesia, Malaysia, Philippines, Singapore and Thailand (Broberg 2013).

As Lomé III rolled into Lomé IV, EU development policy began to include economic and political conditionality as a requirement for assistance, and the Convention even reverted to supporting economic growth through structural adjustment programmes[31], a tried and failed

[31] Structural adjustment programmes (SAPs) is effectively an austerity measure. SAPs consisted of loans provided by Bretton Woods organisations (International Monetary Fund and the World Bank) to nations that were in financial crises. However, conditions imposed by the donors required the recipient nations to implement policies and measures that have been criticized by a number of authors.

process from the 1970s and 1980s (Cardoso and Faletto 1979, Mohan 1997, Beeton 2013). Overall, Lomé IV was notable for a shift towards increased conditionality, economic diversification, regional cooperation and promotion of the private sector (Broberg 2013).

Lomé IV was revised in 1995 into what has since become known as Lomé IV bis (Official Journal of the European Communities 1998, L156/3). Included in Lomé IV bis was the proviso that if any parties were to fail to provide "…respect for human rights, democratic principles and the rule of law", the EU could introduce sanctions, …including partial or total suspension of the Convention" (Broberg 2013). Under this cloud of conditionality the EU was allowed to withhold programme funds until implementation had been completed (Broberg 2013).

Cotonou (2000-2020)

The Cotonou Agreement was a treaty signed between the European Union and 78 ACB countries in Cotonou, Benin in 2000. Its aims were to reduce and subsequently eradicate poverty, contribute to sustainable development and gradually integrate ACB countries into the world economy. The main source of funding by the European Union for the ACP group of nations comes from the European Development Fund (EDF). Good governance was an essential element of the agreement, and was required for development cooperation between the EU and individual countries. A feature of Cotonou is that in addition to central governments, independent 'non-state actors' and local governments, participate in development cooperation. However, the most radical change came in 2008 with the replacement of non-reciprocal trade agreements, which favoured the EU with Economic Partnership Agreements (EPAs) that provided for reciprocal

trade agreements (Broberg 2013). The EPAs were designed to enable the creation of free trade areas and the abolition of customs tariffs between their members.

According to the ACP Secretariat website (http://www.acp.eu.trade.org) major successes of the Cotonou Agreement are its longevity, the increase in democracy of ACP countries, and the incorporation of civil society and the private sector in development at political and practical levels so they are no longer solely benefactors of co-operation. The Secretariat also makes the point that aid alone cannot create development and that along with foreign investment, trade is a determining factor. However, a criticism of the Agreement is that although poverty reduction is one of its primary objectives, aid to Africa has had limited impact on the poor (http://practicalaction.org).

European Consensus and the Lisbon Treaty

The European Consensus on Development (often referred to as the Consensus) was agreed to by the European Parliament, the European Commission, the Council of Ministers and all of the member states in 2005 (Official Journal of the European Union 2006, C46/1). It was designed to provide a framework under which all forms of development assistance to developing countries by the EU, or any member state, should operate (Broberg 2013). The Consensus emphasised the idea that recipient nations should be seen as partners and equals to donor nations, and is inferred by the recipient nations being referred to as 'partner nations' (Broberg 2013). It made development a central goal, and defined sustainable development as including "…good governance, human rights and political, economic, social and environmental aspects" (paragraph 7, 12 and 13 of the European Consensus). A proposal for a new European Consensus on

Development (the new Consensus) was made in 2016, taking into account the framework provided by the Lisbon Treaty (see below). It updated the 2005 Consensus, which pursued achievement of the Millenium Development Goals (see below) by promoting implementation of the so-called 2030 Agenda in partnership with developing countries (European Commission 2018a). The primary objective of development policy under the new Consensus remains the eradication of poverty (European Commission 2018b).

The Lisbon Treaty came into force on 1 December 2009 and importantly, emphasised the need to promote European values to the rest of the world (Broberg 2013). This desire on the part of the EU to promote itself is best illustrated in the wording of the Missionary Principle (Article 3, 5) of the Treaty on European Union (TEU), "In its relations with the wider world, the Union shall uphold and promote its values and interests and contribute to the protection of its citizens. It shall contribute to peace, security, the sustainable development of the Earth, solidarity and mutual respect among peoples, free and fair trade, eradication of poverty and the protection of human rights, in particular the rights of the child, as well as to the strict observance and the development of international law, including respect for the principles of the United Nations Charter" (Broberg 2013).

By stating that EU actions will "…be guided by principles which have inspired its own creation, development and enlargement" the EU's Eurocentric perspective on development was reinforced (Broberg 2013). Under Article 21 TEU section 2, subsection (a)-(c) the EU stated that its international relations policies will "safeguard its values, fundamental interests, security, independence and integrity", that these policies and actions will "…consolidate and support democracy, the rule of law, human rights and the principles of international law", and they will "…preserve peace, prevent conflicts and strengthen international security…".

The 11th European Development Fund

The EU is currently implementing its 11th European Development Fund for the period 2014-2020. The fund has been significantly influenced by the outcomes of the Busan Partnership Agreement reached in Busan, South Korea in 2011, and which led to the Global Partnership for Effective Development Cooperation (Organisation for Economic Co-operation and Development 2018), and by the global post-Millenium Development Goals (post-MDG) framework that was due to succeed the MDGs after 2015 (Knoll 2014, Herrero et al. 2015). However, whereas the outcomes of Busan suggested a "…shift away from a narrow focus on aid to a broader notion of development effectiveness" (Herrero et al., 2015), the 'Agenda for Change' (see below) narrowed the EU development focus. Furthermore, while Busan had suggested there should be 'democratic ownership' that recognises the critical role that parliaments, civil society and local authorities play in promoting domestic accountability, the EU adopted a 'top down' approach to decision making (Herrero et al., 2015).

The 11th EDF has an aid budget of €30.5 billion to provide for national and regional programs in many ACP (African, Caribbean and Pacific) countries and overseas countries and territories (OCTs). However, programming and accountability of the European Development Fund (EDF) is a major political, policy and bureaucratic challenge (Herrero et al. 2015), involving multiple stakeholders, namely the European Commission (EC), the European External Action Service (EEAS), 28 EU member states, the European Parliament and 79 governments belonging to the ACP group of states.

The European Commission's development strategy, 'Agenda for Change', which was adopted in 2011, placed "…inclusive and sustainable growth for human development" at its

centre. This has translated into strong financial support for agriculture[32] and energy[33] but a significant withdrawal from the transport sector (Herrero et al. 2015). Governance is strongly supported under the 'Agenda for Change' and is included as an objective in approximately 90% of National Indicative Programme objectives. Although funding support for governance has increased to nearly 30% of the EDF budget, public finance management received the 'lions share' of this allocation, whereas civil society[34] accounts for only 2% of these funds. Human development received 16% of the EDF budget (Herrero et al. 2015).

Herrero et al (2015) suggested that although the EU's aid program is aligned to in-country development plans, the 'Agenda for Change' policies define the parameters under which European Union Delegation (EUD) proposals were founded, and take precedence over EUD-led negotiations with partner governments and member states. A consequence of this situation is that the National Authorising Officers (NAOs) of African, Caribbean and Pacific countries are often overruled in making decisions, including those on sector choices, sector allocations and aid modalities (Herrero et al. 2015).

Some authors (Burky 2011, Herrero et al. 2015) have suggested that the European Commission's strategy to achieve higher impact aid may be ineffective because "…larger volumes of aid are directed towards sectors with limited absorption capacity, leading to the overcrowding of sectors, sector saturation, aid inefficiency and opportunity costs. By pursuing strict sector concentration (without taking sufficient account of country- and sector-specific context), the EC may be compromising its desire to raise impact, notably by engaging in sectors where there is insufficient traction for reform" (Burky 2011).

[32] Agriculture attracts nearly 30% of EDF funds.
[33] Although the EU has very little experience with energy sector projects and the number of countries focusing on energy has remained stable, the budget for energy projects has risen by a factor of nine.
[34] Civil society is made up of non-governmental organisations and institutions that are concerned with the needs, desires and consent of the citizens.

United Nations Development Programme (UNDP) and funding

The main goal of the United Nations is "…to maintain international peace and security, to develop friendly relations among nations, and to promote social progress, a better living standard and human rights. Its member states are bound together by the principles of the UN Charter**,** an international treaty that spells out the rights and duties of member states" (United Nations 2011). One of the central mandates of the UN Charter is to promote a better life for all through its involvement in social and economic development programmes (United Nations 2011).

The arm of the UN responsible for expressing its development agenda is the United Nations Development Programme (UNDP), which was formed when the United Nations Expanded Programme of Technical Assistance, (created in 1949), and the United Nations Special Fund (established in 1958) were merged in 1965 (United Nations 2011). The UNDP operates in 177 nations, has headquarters in New York, liaison offices in Geneva, Brussels, Copenhagen, Tokyo, and Washington D.C, and regional centres in Bangkok, Bratislava, Cairo, Colombo, Dakar, Johannesburg, Panama and Suva.

The UNDP supports national processes that are designed to accelerate the progress of human development, consistent with its aims to eradicate poverty through development, equitable and sustained economic growth, and capacity development (United Nations 2011). Capacity development, the process through which individuals, organisations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time (CADRI 2017), is the UNDP's philosophy of choice in its efforts to aid human development. To help achieve its objectives technical support is provided to developing nations

in areas of poverty reduction, democratic governance, crisis prevention and recovery, and environmental and sustainable development (United Nations 2011).

The UNDP receives over US$5 billion annually, money that comes from five main sources: voluntary contributions from member states, targeted funds from bilateral donors, targeted funds from multilateral partners, local resources from UNDP program countries and other sources. The largest regular voluntary contributions come from Norway (US$138 million), the Netherlands (US$117 million), Sweden (US$110 million), the United States (US$97 million and the United Kingdom (US$96 million) (United Nations 2011). These funds are discretionary and enable the UNDP to maintain neutrality, universality and independence.

Bilateral donations are reserved for specific purposes determined by the donor and usually come from rich countries that are operating through the Organisation for Economic Co-operation and Development (OECD). In 2011 these funds made up around US$1.4 billion with the largest donors being the United States (US$202 million), Japan (US$193 million) and the United Kingdom (US$189 million) (United Nations 2011). Multilateral donations are also funds whose targets are decided upon by their donors and come from multiple partners and the European Commission, which donates about US$1.3 billion each year (United Nations 2011).

Millennium Development Goals (MDGs)

In September 2000, 147 presidents, prime ministers and monarchs unanimously adopted the United Nations Millennium Declaration and in September 2001 the UN expressed its international objectives in the form of Millennium Development Goals (MDGs), which were to be achieved by 2015 (Clemens et al. 2007). The eight goals are stated in Table 3.1. The first seven goals focus on perceived needs of under-developed nations if they are to achieve

successful development, whereas the eighth goal relates to the participation of developed nations in the process through debt relief, the enabling of better access to technologies and markets by developing nations, and increases in aid (United Nations 2011).

Table 3.1. The Millennium Development Goals

Goal	Objectives
1	To eradicate extreme poverty and hunger
2	To achieve universal primary education
3	To promote gender equality and to empower women
4	To reduce child mortality
5	To improve maternal health
6	To combat HIV/AIDS, malaria and other diseases
7	To ensure environmental sustainability
8	To form a global partnership for development

When the achievements of the Millennium Development Goals were assessed in 2015 the United Nations reported a mixture of successes, uneven progress, challenges and opportunities (United Nations 2015). A useful summary by the Guardian newspaper also noted variable amounts of progress in attaining the eight goals. Notable successes included achievement of the target of halving the proportion of people without access to improved sources of drinking water (part of goal 7), reductions of more than half in child and global maternal mortality although the target levels of two thirds reduction had not been reached (goals 4 and 5), and an impressive rise in primary school enrolment figures (goal 2). However, the target of halting and beginning to reverse the spread of HIV/AIDS had not been met although the number of new HIV infections fell by about 40% between 2000 and 2013 (Guardian 2015). Notable too was that between 2000 and 2014 overseas development assistance from rich nations to developing countries increased by 66% in real terms (goal 8).

The co-architect of the MDGs, Jan Vandemoortle, suggested that perhaps the most positive outcome of the MDG programme has been that they had galvanised political commitment as never before (Vandemoortle 2011). He also noted that in the design of 'post-2015 dialogue' developing countries need a strong voice and that "the process must be led by the stakeholders from developing countries not by those from donor countries" (Vandemoortle and Delamonica 2010). Martine Durant, Statistics Director of the OECD also considered that data acquisition was a short-coming of the MDG and needed to be improved to enable better assessment and for governments to make evidence-based decisions. Many international development organisations, including the European Union and the World Bank now use the MDGs as their template for development (Clemens et al. 2007) and the formulation of a goal-oriented system of development "…prodded the European Union (EU) to rearticulate its orienting principles and roadmaps for action in the development arena" (Lundsgaarde 2010).

On a more negative note, because the target achievement format of the MDGs did not take into account the difficulty of achieving goals, states tend to expend their efforts in target areas they were relatively close to achieving anyway. Additionally, because success was only measured by achieving a goal, getting really close to the objective as in some Sub-Saharan states, was still regarded as a failure (Easterly 2009, Brenner 2015). Unfortunately, this tended to encourage states to funnel resources away from areas that were most in need of them (Brenner 2015).

Sustainable Development Goals (SDGs)

In 2010, five years before the MDG deadline, the UN Secretary-General made recommendations that the General Assembly look into a Post-2015 agenda (Brenner 2015). A United Nations

System Task Team was established, and its deliberations resulted in the establishment of Sustainable Development Goals (SDGs). They are expected to be in place from 2015 to 2030 and comprise up of 17 goals and 169 targets. International economist Aldo Caliari (2015) suggested it will cost $US1 trillion each year to put in place the financial infrastructure required to realise the SDGs.

The 17 goals, many of which are notably optimistic, are listed below:

1. End **poverty** in all of its forms everywhere
2. End **hunger**, achieve food security and improved nutrition and promote sustainable agriculture
3. Ensure **healthy** lives and promote well-being for all at all ages
4. Ensure inclusive and equitable quality **education** and promote lifelong learning opportunities for all
5. Achieve **gender** equality and empower all women and girls
6. Ensure availability and sustainable management of **water** and **sanitation** for all
7. Ensure access to affordable, reliable, sustainable and modern **energy** for all
8. Promote sustained, inclusive and sustainable **economic growth**, full and productive employment and decent work for all
9. Build resilient infrastructure, promote inclusive and sustainable **industrialization** and foster innovation
10. Reduce **inequality** within and amongst countries
11. Make cities and human settlements inclusive, **safe**, resilient and sustainable
12. Ensure **sustainable** consumption and production patterns
13. Take urgent action to combat **climate change** and its impacts
14. Conserve and sustainably use the **oceans**, **seas** and **marine resources** for sustainable development
15. Protect and restore and promote sustainable use of **terrestrial ecosystems**, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt **biodiversity** loss
16. Promote **peaceful** and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
17. Strengthen the means of implementation and revitalize the global partnership for **sustainable development**

One criticisms of the MDGs was that the process of selection and their monitoring was confined to discussions and decisions made outside the UN and without much consultation. However, in the case of the SDGs the entire process is the responsibility of a number of 'key' groups working under the auspices of the United Nations. Drafting of the SDGs was done by the Open Working Group, a political forum[35]. Other groups were established to feed information and advice to the Open Working Group and included the United Nations System Task Team (experts from UN-based development agencies and entities) and a High Level Panel of Eminent Persons (mostly non-UN persons selected by the Secretary General). Academics and various UN-affiliated agencies were also consulted and an internet-based survey made to collect the opinions of 'every-day people' (Brenner 2015).

How effective are the SDGs likely to be? One of the main advisors of the UN Secretary-General, and one of the principal contributors to both the MDGs and the SDGs, is Jeffery Sachs, Director of the Earth Institute, Columbia University. Sachs bases his development philosophy on 'socially inclusive and environmentally sustainable economic growth, which he believes can lead to a better world for all (Sachs 2015), and the SDGs propose that economic growth will promote social inclusiveness and environmental sustainability. However, some authors suggest that it is the global economic growth model that is primarily responsible for threats to our environment, inequality and global conflict because economic growth relies on increased consumption of Earth's limited and ever-decreasing resources. Thus, George Martine (2015) in a commentary on Sachs' 2015 book, considered that our current situation results from ecological abuse and excessive consumption by a minority from the rich nations and the elites of other countries. In contrast, Sachs considered over-population to be a primary obstacle to sustainable development.

[35] See *Open Working Group on Sustainable Development Goals,* SUSTAINABLE DEVELOPMENT KNOWLEDGE PLATFORM, https://sustainabledevelopment.un.org/owg.html (last visited Jan. 16, 2015).

Both the UNDP and Sachs talk about the SDGs being specific and having measurable goals. However, Vandemoortele (2015) was of the opinion that the "…proposed SDGs include targets that are mostly unclear, unfocussed and unmeasurable". He suggested that the reason we have ended up with "…169, mostly fuzzy, targets" is a consequence of the previously mono-polar world[36], becoming multi-polar[37]. Emergence of the G20[38], BRICS[39] and the NDB[40] has challenged traditional Western dominance and the global financial crisis of 2008 "…weakened the credibility of the prevailing development narrative" (Vandemoortele 2015).

The other important limitation of the UN Development Program is that it has a 'top down' approach and targets have been seen as being universally applicable in development. A greater participatory approach involving donors and recipients seems to be needed as argued by Vandemoortle and Delmonica (2010). Alternatives to the 'big push' programmes promoted by the likes of Jeffrey Sachs and the UN are so called 'piece meal' programmes promoted by people such as William Easterly, Professor of Economics at New York University (Easterly 2006, Easterly and Sachs 2006). Having had experience with the 'piecemeal' projects approach, admittedly at a small-scale, I can say with some certainty that a 'piecemeal' approach enables activities to be targeted to specific communities and their needs. In contrast the 'big push' approach places all people and their problems into a huge basket and attempts to find solutions that fit all situations. That is not say however, that either 'big push' or 'piecemeal' styled programmes are good or bad, rather that each may be appropriate in different situations.

[36] Prior to the dissolution of the combined Soviet states one could say there were two super powers in the world, the USSR and the USA. After the dissolution of the USSR the world became monopolar with the USA being the only remaining super power.
[37] The emergence of organisations like the G77, BRICS (Brazil, Russia, India, China and South Africa), plus China have challenged the dominance of the West in international affairs and led to a multipolar world.
[38] Group of 20 or G20 is an international forum of the governments and central bank governors from 20 of the major economies.
[39] BRICS, or Brazil, Russia, India, China and South Africa are a group of emerging economies
[40] The New Development Bank, formerly referred to as the BRICS Development Bank.

The Bretton Woods Organisations: World Bank Group (WBG) and International Monetary Fund (IMF)

Establishment of the World Bank Group (WBG) began after the Bretton Woods Conference[41] with the formation of the International Bank for Reconstruction and Development (IBRD) and the International Monetary Fund (IMF). The International Development Association (IDA) was formed a little later. The WBG began its lending operations and technical assistance programmes in 1947 primarily to provide support for engineering-related projects and/or technical assistance (Bazbauers 2013). Funds have subsequently supported feasibility studies, engineering solutions, and construction supervision in areas of agriculture, education, industry and telecommunications (Bazbauers 2013). The WBG president is appointed by the President of the United States of America and the head of the IMF is usually a European. The WB and IMF governance structures are dominated by industrialised nations and decisions regarding policy and funding are made by the G7, as they are the largest donors (Caliari 2015).

Over time, the WBG has gradually moved away from funding hardware projects to projects that build institutional and technical assistance in areas of policy making and management support, with significant emphasis being placed on institutional and human development in the financial, governance, legislative, regulatory and trade sectors during the 1970s and 1980s. Bazbauers (2013) suggested that the move from hardware-funded projects to software-funded projects was the result of the impacts of the "…1973 and 1979 Oil Shocks, the onset of the 1982 Debt Crisis, and the neoliberal revolution [that] spurred the transition towards

[41] Formerly known as the United Nations Monetary and Financial Conference held in Bretton Woods, New Hampshire, USA

institution-building software, or soft technical assistance". The move from 'hardware' to 'software' is in line with a speech given by then World Bank President Robert Zoellick in 2009, which emphasised the importance of 'knowledge products' as the main drivers of global development (Bazbauers 2013). He also noted that the World Bank "…is a repository of global best practice in development, combining implementation experience, research, and learning, drawing on both public and private sectors" (Zoellick 2009).

Some authors have suggested, however, that the move away from funding 'hardware' projects that had a relatively high success rate, created a number of issues for developing nations. For example, Bazbauers (2015) noted that "…technical assistance is often donor driven, project objectives often lack clarity, the short term support goals often receive precedence over longer term institutional development goals, the sensitive nature of economic policy and financial prescriptions often leads to friction between the public and private sectors, training programs are often insufficient, over reliance on temporary appointed expatriate advisors often leads to antagonism, as even low ranked expats receive salaries several times higher than domestic officials and technical assistance can lead to knowledge dependence".

The development philosophy being promoted by the World Bank Group, IMF, EU, BRICS, WTO and almost all of the major development-related organisations is based on the Western view of modernity. In other words, national development requires a transition from the traditional societies of indigenous peoples to a modern industrialised society (Escobar 1987, Sachs 1990, Max-Neef 1992, Escobar 1997). In 2013 the World Bank suggested that private sector resources and expertise are critical if the two goals of ending extreme poverty, and boosting shared prosperity by 2030 are to be achieved (Bretton Woods Project 2014). To that

end, the International Finance Corporation (IFC) was formed as the private sector arm of the World Bank Group.

The International Monetary Fund makes technical assistance available free of charge to member countries, although during the years between its beginnings in the 1940s and the end of the Cold War technical assistance was a small part of its programme funds. As the countries of the former USSR became members, the IMF technical assistance programmes became more prominent and numerous (Bazbauers 2013), with the IMF becoming a niche technical provider in areas of macro-economic policy, financial stability, structural reform, foreign exchange policy and systems, fiscal policy, tax policy and revenue administration, the prevention of financial crisis contagion, the formulation and implementation of growth-oriented and poverty reducing schemes and debt relief (Wilairat, 2011; IMF, 2005, 2008b).

In the past the World Bank has argued for the rights of small farmers and the need to support them with policies and funding, while also being influential in, and facilitating, large-scale acquisitions of land (Akram-Lodhi 2008, White et al. 2012). The World Bank's advocacy of large scale land acquisitions in 2008 was linked to what it believed would be significant advantages for the global economy (White et al. 2012). Thus, in its much-cited report on 'Agriculture for Development' (World Bank, 2008) a dualistic agrarian economy was envisaged, with large-scale farms engaged in production, often for export, and smallholder farms having contract arrangements, or gradually disappearing. Land has also been acquired in undeveloped countries for numerous positive purposes including the establishment of water and electricity supplies, watershed management, waste management, urban and transport development, in addition to the food and biofuel production and forestry (Hall 2010, Roquet et al. 2017, Vanguard 2018). However, IFC-supported programs have also had negative outcomes for

recipient nations and including the need to resettle local communities (Alesina and Dollar 2000, Alesina and Weder 2002, Bretton Woods Project 2005, Akram-Lodhi 2008, Bakre 2011, Bush et al. 2011b, White et al. 2012, Bazbauers 2013, Amnesty International 2014, Caliari 2015).

Overall, it is clear that the World Bank Group of organisations, including the International Monetary Fund, are in a position of great influence with respect to financing for development (Bretton Woods Project 2005). Their ability to obtain significant funding enables them to define policy, introduce restrictions, and insist on changes to legislature, policy and the politics of applicants. Having such influence can therefore have both positive and negative consequences for both applicant communities and the environment as indicated by numerous reports from Oxfam (Mombrial 2014), Amnesty International (Amnesty 2014) and others (e.g. Marriott 2014, Sinani 2014).

Brazil Russia India China and South Africa (BRICS)

The first formal BRIC summit was held in Yekaterinburg, Russia on 16 June 2009. Attended by representatives from Brazil, Russia, India and China the focus of the summit was to identify ways of improving the global economic situation and to participate in the reformation of financial institutions. In 2010 South Africa joined the group, which became known as BRICS. In 2013 the BRICS nations pledged US $75 billion in loans to the IMF on condition that the IMF implement voting reforms, and in 2014 when these reforms failed to be implemented the BRICS nations decided to establish their own global financial institution that would rival the IMF and World Bank. After a great deal of negotiation among the BRICS partners over governance, the US$100 billion New Development Bank, or BRICS Development Bank, was established. By the

end of October 2014 the BRICS member states had sold off their US investments (Brazil US$261.7 billion; India US$77 billion; China US$ 1.25 trillion; and South Africa US$10.3 billion).

BRICS are generally viewed as being the 'new kids on the block' or as 'emerging development partners' when it comes to providing financial support to Low Income Countries (LICs). However, "…Brazil, China and India have provided assistance as part of South-South cooperation, while Russia's engagement has been shaped by the Cold War era" (Mwase and Yang 2012).

Although BRICS, like the Organisation for Economic Co-operation and Development (OECD) targets poverty reduction as a primary focus of its activities, it differs in a number of ways from OECD-DAC[43] members and other traditional donors. Firstly, BRICS funding operates under the spirit of 'mutual benefit', with most finance being allocated for improvements in the infrastructure sector that supports productive activities. Secondly, they pursue a policy of non-interference in the internal affairs of the recipient countries, and unlike traditional donors, BRICS projects do not include policy conditionality as a requirement for recipient nations; instead they prefer to 'tie aid'[44] (Mwase and Yang 2012). Unlike traditional development fund requirements that attach conditions related to governance, economic policy, institutional reforms and forced cooperation, 'tied aid' does not undermine national sovereignty, but promotes solidarity, thereby lowering the risk of financial mismanagement and the misappropriation of funds (Mwase and Yang 2012). As nations that have been the recipients of aid and other forms of

[43] The OECD was established in 1961 and has its headquarters in Paris, France. OECD-DAC is the OECD Development Assistance Committee that is made up of 29 predominantly Western nations with the World Bank, the International Monetary Fund and the United Nations Development Programmes as observers (http://www.oecd.org/dac/developmentassistancecommitteedac.htm).

[44] Development funding that is 'tied' to purchases from the donor country.

development assistance from donor nations in the recent past, the BRICS nations have an affinity and understanding of the negative impacts of traditional development assistance on recipients (Mwase and Yang 2012). Principles of equality, solidarity, mutual benefit and complementarity highlight the desire of Brazil, China and India at least, to view themselves, not as donors but as development partners. Their ability to empathise with other recipient nations contributes to their "…sensitivity to the term aid"[45] (Mwase and Yang 2012).

By financing the infrastructure of Low Income Countries (LICs) BRICS funding has helped LICs increase productivity by addressing infrastructure deficits, reducing business costs for local and export markets and by supporting the expansion of trade and investment industries (Mwase and Yang 2012). The focus on bilateral government to government funding has enabled project funding to have a shorter approval time than is usually the case with more traditional funding organisations. In general, loans from BRICS are for projects that are shown through feasibility studies to be economically viable; otherwise, BRICS will issue grants. Since the beginning of BRIC (Brazil, Russia, India and China), and the inclusion of South Africa to form BRICS, funding for development-related projects and programs and the issuing of grants has been in the most part to nations that are or have:

- neighbours of BRICS nations
    - Russia supports former Soviet neighbouring countries
    - India supports close neighbours
- natural resources that are desirable
    - China supports all African countries except Swaziland, which retains ties with Taiwan

[45] China does not view itself as a provider of aid.

        - 70% of its funds go to nations with oil fields (Angola, Ethiopia, Nigeria and Sudan)
- some form of cultural or language connection
        - Brazil provides the majority of its support to Portuguese speaking countries
        - Russia supports neighbouring, formerly Soviet countries

Although BRICS opposes the use of 'conditionality' as a prerequisite for the approval of development funding it is unclear whether their alternative, 'tied aid' has been able to address concerns over an apparent lack of transparency and corruption regarding their development funding policies, or whether programmes supported by BRICS return positive outcomes for both the fund recipient and the institution that has issued the funds (Alesina and Dollar 2000, Svensson 2003). The relatively short approval time for BRICS funding compared to that from traditional donors, often may be related to limited, or inadequate, consultation processes that can result in recipients feeling uncertain as to the terms of financial agreements (Mwase and Yang 2012). It has also suggested that the BRICS fund requirements may give the donor country an unfair advantage over the recipient. For example, BRICS donors may preferentially use labour and equipment from their own countries rather than local labour and machinery. Furthermore, the China-Africa Development Fund, which was set up to assist Chinese businesses and entrepreneurs invest in Africa, may offer potential benefits to the Chinese whilst disadvantaging local African businesses (Mwase and Yang 2012).

Multinational Corporations (MNCs) and Transnational Corporations (TNCs)

Multinational corporations (MNCs) are large businesses that operate in more than one country. Their headquarters are located in one country but their activities may spread over many others (Monks and Minow 2012). Because their primary objective is to make money MNCs differ from NGOs (non-governmental organisations), which are non-profit local or cross-border groups that provide services ranging from education and information collecting to political activism and charity (Cahill 2003, SparkNotes 2018). Nevertheless, many commentators do not make this distinction and refer to MNCs as NGOs. Sometimes they are also referred to as transnational corporations (TNCs), although technically TNCs do not identify themselves with a single national parent company but operate out of multiple nations. Examples of MNCs are Coca Cola, Apple, Microsoft and IBM, whereas Nestlé and Royal Dutch Shell are TNCs. Some MNCs have gained a reputation for dubious practices, notably in the 'development industry' ExxonMobil, for example, has been criticised for suspect activities relating to the use of land for oil-drilling in undeveloped countries, human rights violations in Indonesia and creating environmental issues in Russia (Thompson 2012, Wikipedia 2016).

Formal recognition of private sector involvement in the arena of global governance- and development-related activities can be traced back to a speech given in 2000 by then Secretary General of the United Nations, Kofi Annan who stated that he was "…convinced that the UN would achieve little in the twenty-first century unless it reached out to such people [business people] and convinced them that it was a useful ally, able and willing to work with them to achieve their ends" (Weiss et al. 2013). Establishment of the UN Global Compact (UNGC) at the Millennium Summit in 2000 reinforced the UN's belief in the necessary involvement of the private sector in global affairs, including development. After a decade the UNGC had over 7,500 members but had no mandate to require corporates to adhere to the UNGC's guiding principles.

Instead, it relies on voluntary compliance to these guiding principles by its members. Given the size and potential impact that the larger TNCs possess, their policies and procedures can have a direct impact on the health, education and well-being of communities in which they operate (Weiss et al. 2013).

It has been suggested that although the UN has put in place the opportunity for Non-governmental Organisations (NGOs) and International Governmental Organisations (IGOs) to monitor and evaluate TNC activities funded through the UN, an alternative, and possibly better method might be through mobile technologies and media coverage of events. For example, if a fire in a Bangladesh factory that produces cheap clothing for the European and US markets killed many workers, ridicule through social media might result in TNCs addressing the need for better facilities for workers (Weiss et al. 2013).

Notable events associated with Foreign Direct Investment by TNCs at the global level have occurred three times in the past 70 years. The first of these was after World War 2 and involved investors from the USA who were attracted to Europe. The second period was in the 1960s when TNCs from wealthy nations were attracted to Asia by government incentives, new markets and cheap labour. Thirdly, TNC investors were attracted to developing Asian nations with Newly Industrialised Economies (NIEs) that were searching for new markets and cheap labour (Okposin and Temitope 2015). These authors also suggested that "…the flow of FDI from NIEs is not only a testament to the fact that investment is fundamental to economic growth and development, but also that recipients of FDI can evolve to become foreign investment". Adeniyi and Omisakin (2012) supported this view but also suggested that the majority of FDI from TNCs flows to the richer developing nations. Often governments of de-colonised nations see TNCs as being the agents for new colonisation, which, like old colonisation, is primarily interested in

resource acquisition and cheap labour without adequate compensation (Koenig-Archibugi 2004b).

Nations that have been able to attract significant FDI have introduced measures of economic reform, are democratic, have introduced privatisation policies and have generally stable societies (Adeniyi and Omisakin 2012). Although the largest amount of FDI comes from the top five TNCs a growing number of other TNCs have their origins in developing and newly industrialised economies. To illustrate this point, Thite et al. (2012) pointed out that Asian companies which were struggling to survive only a decade or two ago now dominate the top one hundred largest TNCs.

Over the past decades TNCs have been engaging in activities that were traditionally regarded as functions of governments (Scherer and Palazzo 2011). For example, they have taken up opportunities in public health, education, social security and the protection of human rights, particularly in underdeveloped nations and failed states (Matten and Crane, 2005). TRCs are also involved with AIDS, malnutrition, homelessness, and illiteracy (Margolis and Walsh 2003, Rosen et al. 2003); they participate in defining codes of ethics (Cragg 2005), protection of the environment and resource management (Hart 2005, Marcus and Fremeth 2009); legislation, legal regulation, the establishment of moral norms (Scherer and Smid 2000); and the promotion of societal peace and stability (Scherer and Palazzo 2011). On the other hand, Sachs and Santarius (2014) suggested that "Multinational companies are often the agents of public corruption, bribing officials to bend regulations or tax policies in their favor and engaging in tax evasion, money laundering and reckless environmental damage".

In 2015, Forbes online magazine published an article called “The 147 companies that control everything” (Upbin 2015). In this article the author commented on a study that was carried out by complex systems analysts on the connectivity of global economic activities and their control. The analysts looked at the connectivity of an original data base of some 37,000,000 companies and 43,060 transnational companies linked to them and created a computer model to identify who owns what (Upbin 2015). The model showed that a group of 147 interconnected companies was at the core of the network, had inter-locking stakes in each other and had 40% of global wealth, while a total of 737 companies within the core and its immediate periphery owned 80% of global wealth (Glattfelder and Battiston 2009, Glattfelder 2010, Vitali et al. 2011, Upbin 2015). The inference here is that MNCs and TNCs have significant influence on global matters and are becoming increasingly involved in matters of sovereign states and international bodies associated with development. It is important however, to remember that the prime purpose of a company is to make a profit on their investment, so although their motivations may appear altruistic their underlying philosophy is essentially a version of the neoliberal economic model (see Chapter 2).

Rhetoric surrounding the potential positive benefits presented by FDI and foreign lease/ownership of resources in developing nations has been founded on the idea that foreign investor involvement in developing nations will result in the construction of local infrastructure, the opening of local and international markets for local suppliers of goods, and increased local employment. That is, FDI is expected to produce significant economic, social and environmental benefits to the host nations (Myrdal 1970, Streeten 1972, Cherney et al. 1974, International

Labour Organisation 1976, ulHaq 1976, Seers 1979b). The idea that 'spill over'[46], a concept similar to 'trickle down'[47], will provide significant economic benefits to poorer nations from FDI is often touted as being a solution to poverty. However, the reality may be quite different from the hype (Adeniyi and Omisakin 2012). Neither 'spill over', nor 'trickle down' economic concepts are new as indicated in Chapter 2.

While a number of studies suggest that FDI may well increase the productivity of foreign-owned firms in developing nations, in many cases it tends to lower the productivity of locally owned firms (Adeniyi and Omisakin 2012). TNCs and MNCs have also been accused of land grabbing, water grabbing, forcing evictions of local populations and indigenous peoples from customary land, corruption of officials, and leveraging changes to legislature, governance and society in the name of development.

Under the Westphalian system[48] sovereign states can be held accountable for actions similar to those mentioned above by international courts like the International Criminal Court. However, unlike sovereign nations, which are recognised as being legal entities, and therefore can be tried by the International Criminal Courts for crimes against humanity, TNCs and MNCs are not recognised as being legal entities and consequently, are not able to be tried by international courts. Globalisation and the continued popularity of TNCs and MNCs make it

[46] An increase in trade the FDI can enhance by providing opportunities for local businesses to benefit from multilateral alliances used by the FDI. Spillovers can also relate to actions of the FDI having a negative impact on host nations.

21Trickle down in the context of this thesis relates to host nations offering benefits to FDIs in the hope that the benefits realised by the FDIs will also provide benefits to the host nations and their communities.

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[48] The Westphalian world order, as used in the political sciences, is named after the treaty of Westphalia (1648), which ended the Thirty Years' War in Europe. It laid the foundation of the political system in Europe and the independence of states. The Westphalian order rests mainly on the steering capacity of the state authorities of sovereign countries with both a monopoly on the use of force on their territories and more or less homogeneous national cultures that lead to a stabilisation of social roles and expectations within coherent communities (Scherer and Palazzo 2011)

difficult for national governments to hold them accountable (Koenig-Archibugi 2004a, b). Some political scientists and philosophers now speak of a "post-Westphalian" order (Falk 2002, Kobrin 2001, Santoro 2010) and Scherer and Palazzo (2011) went as far as to suggest that globalisation threatens nation-state authority through the "…weakening of democratic control and rule of law".

Large scale land acquisitions (land grabs[49]) are defined as being transactions where between 1,000 and 500,000 hectares are purchased, leased or rented (Onoja and Achike 2015). The World Bank documented worldwide land acquisitions over one year (2008-2009) as being about 56.6 million hectares (Cotula 2012). Two thirds of these land acquisitions (40 million hectares) took place in Africa with Asia (8 million hectares) being the next largest recipient of FDI for land purchases (Cotula 2012). A report released in 2011 indicated that during the period 2001-2010 land deals for 227 million hectares had been made for large scale agriculture in under-developed nations (Cotula 2012).

Many large 'land grabs' have been in countries where the FAO suggests "…most land is used or claimed by somebody, regardless of how it may be labelled officially" (Onoja and Achike 2015). For example, a report by the FAO in 2011 showed that Nigeria sold 136,000 hectares of its best crop-producing land to foreign investors to produce bio-fuels, despite approximately 6 percent of Nigerians being undernourished (Onoja and Achike 2015). A number of authors have also suggested that 'land grabs' are increasingly marginalising local farmers and communities (Escobar 2003, Akram-Lodhi 2008, Borras et al. 2011, Bush et al. 2011a, Bush et al. 2011b, Buur et al. 2011, Borras et al. 2012, Cotula 2012, Rullia et al. 2012, White et al. 2012,

[49] The term 'land grabbing' can be defined as referring to large-scale, cross-border land deals or transactions, which are carried out by TNCs/MNCs or by foreign governments that relate to long-term leases (often for 30–99 years), concessions, or outright purchases of large areas of land in other countries for various purposes (GRAIN 2008).

Woodhouse 2012, Borras et al. 2013, Ness et al. 2015, Onoja and Achike 2015). Sadly, land, like food and water, has become a currency and a tradeable product in the hands of investors (Escobar 2003, Onoja and Achike 2015). Nevertheless, land has also been acquired for numerous purposes that benefit local communities as indicated above when discussing the use of funding provided by the World Bank.

As with 'spill over' and 'trickle down', companies and governments that are promoting the use of land for the production of bio-fuels, mining and food production are promising economic development, jobs, fuel supplies and food for the purchase and/or lease of land (Onoja and Achike 2015). Yet the reality appears to be far different for many. For example, John Vidal, environment editor of The Guardian, reported in 2010 that in Ethiopia "…foreign companies are arriving in large numbers, depriving people of land they have used for centuries. There is no consultation with the indigenous population. The deals are done secretly" and "…the local people see…people coming with lots of tractors to invade their lands". For instance, customary land ownership exposed land to opportunities by national and foreign investors in the Oromian region of Ethiopia where "…India had acquired 2.5 million acres, Djibouti 2,500 acres, Saudi Arabia 250,000 acres" mainly for rice production, while Oromos were dying from man-made famine (Vidal 2010). Clearly, vast amounts of foreign direct investment are being deployed for the purchase of land in places like Africa where the "…regulatory and legal frameworks are ill-equipped to defend the interests of existing land users or the wider public interest" (Woodhouse 2012). Revealingly, the World Bank (2010) commented that "…some foreign investment has in fact targeted countries with weak regulations".

Often left out of discussions about land acquisition is the role that access to water plays in FDI project design and implementation and its impact on local populations (Cotula 2012).

Debates relating to FDI purchases of land for agriculture and/or mining may downplay the importance of water, despite access to it being essential for the development of agricultural land (Woodhouse 2012). Woodhouse (2012) also suggested that "…even where land acquisition deals do not specify irrigation, choice of location and/or crop type indicates this is invariably an implicit requirement of projects". As access to adequate moisture is fundamental to the success of agriculture, it no surprise that investors expect "…exclusive rights to 'green' water (rainfall and plant transpiration) on that land" (Woodhouse 2012).

The UNDP (2006) suggested that implied rights to 'green' water have been elaborated upon to include rights to 'blue' water (rivers, lakes and aquifers), and some authors have even suggested that water and water rights are the "…hidden agenda behind many land acquisition deals" (Onoja and Achike 2015). These authors also commented that some investors are seeking control of the water resource through long leases or land purchases and do not commit to expensive land development. For example, in West Africa only 20 percent of land deals have been followed by productive investment (Onoja and Achike 2015). It is worth noting too that unlike land, rivers and lakes have indistinct boundaries so strategic purchase of land at a water source or lakeside means that excessive abstraction of water upstream is likely to leave little for users downstream (Onoja and Achike 2015).

Arguably, technologies are available to make better use of existing water supplies (waste water recycling, better irrigation methods), including desalination for coastal areas of countries such as China and, India and the Gulf countries. However, establishment of these technologies is normally expensive and it makes better economic sense for emerging nations to purchase land and have exclusive rights to water resources in poorer countries in Africa, South America and Asia (Woodhouse 2012). Thus, Saudi Arabian investments made to purchase 700,000 hectares of

irrigated land in Niger, Ghana, Mali, Senegal, Burkina Faso, Uganda and Sudan were profit driven, with many purchasers producing biofuels instead of agriculture as suggested prior to acquisition (Woodhouse 2012, Onoja and Achike 2015). Woodhouse (2012) also stated that some of the land purchased in Africa would grow seven million tonnes of rice each year, and would require 2,492 litres of water for each kilogram produced (see table below). The importance of secured water supplies for food production from either 'green water' or 'blue water' resources for agriculture cannot be underestimated and the quantity of water required is therefore quite staggering.

Table 3.2. Amounts of water required to produce one kilogram of various food items produced by large corporations on land they have either bought, leased or rented (IME 2015).

Food Item	Water Required (Litres)
Chocolate	17,196
Beef	15,415
Sheep Meat	10,412
Pork	5,988
Rice	2,492
Chicken Meat	4,325
Banana	790

Non-governmental Organisations (NGOs)

NGOs are non-profit organisations that operate independently of any government, typically to address social, political or environmental issues. They are usually funded by donations and/or membership fees and may be run by volunteers; however, some are state- or corporate-funded

and managed. Although they may have professional staff, overheads of NGOs are typically less than 20%, and frequently much lower (Gibbs et al. 1999). In contrast, the World Bank typically allows 37% for overheads in its funded programs (Gibbs et al. 1999). Examples of international NGOs are Save the Children, OXFAM and the Rockefeller Foundation, whereas YMCAs are national NGOs. In contrast, The United Nations, the European Union, OPEC and the World Bank can be described as International Governmental Organisations (IGOs).

In recent years non-governmental organisations have become increasingly important in the international aid community, not only by using private and corporate funding for humanitarian projects in undeveloped countries but as official recipients of government funding from sources such as the World Bank, the EU, USAID and others. This growth in governmental funding reflects the perception that NGOs can be efficient providers of humanitarian services and economic development aid (McCoskey 2009). Nevertheless, scepticism about the effectiveness of such aid programs, and in fact foreign investment and development aid in general, has been rife, and people have questioned whether it is worth investing in (Alford 2015). Based on his experience as director of research and impact at Send a Cow, an agriculture-focused NGO working in Africa, Ritchie Alford believes that aid is most effective when it is delivered with local training and carried out by local people. It should therefore be seen as an investment that starts to "give people the skills to take control and have the ability to deliver change' (Alford 2015). These are similar sentiments to those promoted by the Enpovigo development philosophy (see Chapter 4) and the activities and methodologies employed by EcoCARE Pacific (see Chapter 5). As Chief Executive Officer and co-founder of a small NGO (EcoCARE Pacific) and as someone who has also been employed by a number of other NGOs[50] I have found that there

[50] Greenpeace is an example of a large non-governmental environmental organisation that is located in 39 countries

are benefits to be had from both large and small NGOs. For example large NGOs are able to access significant resources that enable them to participate in internationally relevant issues (climate change, whaling, oil spills, etc.) but large NGOs can be cumbersome when trying to adjust their position or address new and unique issues. Although small NGOs may not have access to similarly significant resources as large NGOs they are more easily able to adjust their position regarding new and/or unique issues that may arise and they are often local in their context and personnel in theory, making their activities more relevant to local and/or national issues and solutions.

Critics of NGOs have suggested that some NGOs can be un-coordinated in their activities, target outcomes and methodologies (Pfeiffer 2003). Pfeiffer (2003) states that NGOs may be involved in 'parallel projects' that don't maximise the impact of limited funds, that they splinter limited resources and undermine local control of local issues. During my own involvement with some NGOs in Tonga I have witnessed varying amounts of nepotism where opportunities have been offered to relatives in preference to others who may not be related or to individuals of similar social standing.

Summary

In this chapter I have summarised the history, structure and functions of major organisations and institutions involved in financing for development. It is apparent that there is a lot of money available, and a lot of money is being spent on development, yet problems of inequality, starvation, poverty, lack of education, lack of access to health care, unsafe and unpalatable water supplies, etc. remain for the world's poor. It is also apparent that the major players in

development funding promote the idea that economics is the key to solving the problems of development, and that economics will solve the world's woes.

It seems that human-focussed developments like the Capabilities Approach of Sens, human rights approaches, environmental approaches, sustainability approaches and so on have been shuffled aside by global neoliberal economics. The rich West has the controlling interests in the UN, the WBG, IMF and the EU in the allocation of development funds; BRICS has a somewhat different agenda, but focuses on economics and investment to provide solutions. Not unreasonably, TNCs and MNCs are likely to have their shareholders' interests up front.

It is interesting to note that although the main Western organisations, including government aid organisations, promote the idea that development funding will only be made available to countries that promote democracy and market-led endeavours, the BRICS economies were successful during the global recession of recent times. The irony is that as far as governance is concerned the BRICS nations are democracies in the case of Brazil, India and South Africa, but authoritarian states in the case of China and Russia. As far as economic structures and ideologies are concerned China and Russia, and to a lesser degree Brazil, are state managed economies (Harmer and Buse 2014). In 2011 O'Neil (2011) noted that "…the world economy has doubled in size since 2001, and a third of that growth has come from the BRICS". Such dramatic results from nations that seem to contradict many of the prescribed requirements for funding from the European Union, United Nations, the Bretton Woods organisations and other Western government development funds brings into question, at least to me, the motives of these governments and organisations.

Western members of the OECD have defined the ideas and practices of international development, particularly the norms and standards that have evolved via the Development Co-operation Directorate of the Organisation for Economic Co-operation and Development (Harmer et al. 2013, Harmer and Buse 2014). Organisations like the World Bank and the IMF believe they are the foremost authorities on development, yet despite billions if not trillions of US dollars having been spent in the name of development many of the problems they fund to resolve, remain. As cogently stated by Brenner (2015) "…more money and more speech do not necessarily, translate into more results".

By following a Neoliberal economic pathway with an emphasis on growth, issues relating to climate change will continue to become more and more exacerbated. Pollutants will continue to poison our air, land and waters; people will continue to have their lands stolen and deforested for the production of GMOs, bio-fuels and agriculture; seas and freshwaters will continue to be over-fished and used as waste dumps, and degradation of the world's environment will continue to accelerate. Clearly, alternative approaches to development are required. One of these, which I call Enpovigo, is the subject of the next chapter.

Chapter 4 Enpovigo: capability, participation and happiness

"Experience without theory is blind, but theory without experience is mere intellectual play".

Immanuel Kant

Introduction

The Enpovigo development strategy has evolved over a number of years and is founded upon several aspects of a number of theories. In particular, the Capability Approach of (Sen 1981, 1985, 1999) and the Participatory approach (Freire 1970, Cleaver 1999) have had considerable influence on its development. Thus, the former emphasises the importance of building capabilities for successful development, while the latter relates significantly to participation and collaboration between donors and recipients of aid. Both the Capability Approach and the Participatory Approach also have considerable influence on project sustainability. To a lesser degree aspects of a number of other theories relating to development strategies have also been important in formulating Enpovigo. They include environment based theories (Tivy and O'Hare 1982, Redclift 1989, Beckerman 1992, Goldsmith 1997), sustainability theories (Meadows et al. 1972, Brown et al. 1987, Dixon and Fallon 1989, Beckerman 1992, Gladwin et al. 1995, Bossel 1999), and the basic needs approach to development (Seers 1963, 1972, International Labour Organisation 1976, Jolly 1976, Ahulawalia et al. 1978, Streeten 1979, Burki and Haq 1981, Streeten 1981, Emmerij 2010).

Ideas relating to spatial scaling (Weins 1989, Delsol et al. 2017), macro-systems ecology (Fei et al. 2016) and globalisation (Gill and Law 1989, McMichael 1996, Kobrin 2008), have also been influential in the development of Enpovigo along with an appreciation of cultural (Sardar 1996, Gegeo 1998, Chaudhry et al. 2014), gender (Boserup 1970, Mies 1986, Jahan

1996, Bifani-Richard 1999, Sen 2006b, Hennessey 2014) and knowledge-based (Chan and Costa 2005, Robeyns 2005, Turnbull 2009, Pritchard and Turri 2011, Blustein et al. 2014) issues. Enpovigo supports both 'Big Push[51]'-funded programs that have been promoted by people like Jeffery Sachs (Sachs 2005) and the 'Piece Meal[52]' approach to project funding promoted by others including William Easterly (Easterly 2006), both approaches are relevant and fitting in appropriate situations.

The proposal embedded in Enpovigo that the acquisition of capacity[53] and capabilities[54] can result from utilisation of acquired knowledge through access to information is not a unique concept (Freeman et al. 1970, Sen 1985, Agrawal 1995, Sen 1999, Steinmueller 2001, Hylén 2007, Monahan 2009, Qureshi 2010). However, the Enpovigo development strategy differs from many others in the emphasis placed on participation with partners in the selection and implementation of development projects and in its holistic perspective. As a result, projects that are based on the Enpovigo development strategy are expected to help support the sustainable self-determination of individuals, communities or nations so they are better able to choose their own paths through the empowerment that knowledge presents. In so doing, they should also become 'happier' (from both the utilitarian and cognitive perspectives) than they were prior to the onset of development activities.

Information, knowledge, capacity and capability

[51] Big Push is illustrated by the mobilisation of large funds and is the main funding philosophy of organisations like: the European Unions European Development Fund, World Bank Group and International Monetary Fund, Brazil Russia India China and South Africa Bank, Trans National Corporations and Multi National Corporations funding, the United Nations based Millennium Development Goals and the Sustainable Development Goals.
[52] The primary method of funding for NGOs, civil society and numerous volunteer based organisations for fund acquisition and project implementation
[53] In this work I suggest that 'capacity' relates to acquiring skills, competencies and abilities.
[54] I suggest that 'capability' is the ability to perform or achieve certain outcomes and represents the intersection between capacity and ability.

The acquisition of knowledge provides a powerful tool for individuals and communities. Many scholars and authors have alluded to this, or similar ideas (Sen 1992, Nussbaum and Sen 1993, Comim 2001, Steinmueller 2001, Clark 2005, Robeyns 2005, Gasper 2006, Schischka 2006, Ekaputri 2007, Hylén 2007, Smith 2007, Fuchs 2008, Azubuike 2009, Monahan 2009, Hanna 2010, Qureshi 2010, Ubels et al. 2010, Badragheh and Abedi 2011, Nussbaum 2011, Robeyns 2011, Babu 2014), and others have noted that countries which invest in building the capacity of their citizens achieve faster economic growth than those that fail to do so (Barro 1996, Schreyer 2000b, Hanna 2003, McFarlane 2006, Qureshi 2006, Bada and Madon 2010, Blake and Garzon 2010, Hanna 2010, Silva and Westrup 2010, Egypt 2011, Babu 2014). Thus, access to information offers people the opportunity to build knowledge and so make informed choices about issues that affect them and their environments (Andersson et al. 2010). In particular, it enables people in undeveloped countries to build capacity and capabilities.

Information is viewed by many as being a global public good (GPG) and for many users in developed countries large amounts of information are available on the World Wide Web and in other places. Nevertheless, intellectual property[56] rights (IPRs) restrict access to some information and many people living in undeveloped or impoverished nations, in particular, are less able to expand their knowledge because they cannot pay the fees required for access to restricted information (Gerster and Zimmermann 2003). Many peer reviewed journals are cases in point as they require users to either pay an annual subscription[57] or pay directly for access to

[56] According to the Oxford English Dictionary 'intellectual property' is the intangible property that is the result of creativity, such as patents, copyrights, etc.

[57] As at the 8th March 2017 from the Nature website a subscription to Nature for one year in USD is: USA $199, Armenia $221, Burundi $256, Ethiopia $256 and it seems that for the majority of poor nations that I compared the price is US$256.

individual articles. One consequence of such restrictions on access to information is a reduced ability to develop capabilities and capacity.

Information communications technology (ICTs) in combination with renewable energies offers an appropriate way of facilitating access to information and is particularly relevant for people living on remote islands and/or in remote communities located outside major centres. Tonga provides a good example of a country where many communities have restricted access to information, a situation I expand upon in Chapter 5. In wealthy nations access to information is taken for granted by most people and is vital for the success of businesses, commerce and finance, whereas the difficulty of access to information experienced by inhabitants of poorer, more isolated communities clearly disadvantages them in these and many other areas (Schramm 1964, Rogers 1974, Clemons et al. 1993, Barro 1996, Annan 1998, Avgerou 1998, Schreyer 2000a, Steinmueller 2001, Sahaya and Avgerou 2002, Harris 2004).

In the present day world many of the benefits accruing to wealthy nations through access to information are provided by ICTs whereas their absence or more limited availability in many poorer countries is a significant impediment to their development (Harris 2004, Dahlman and Utz 2005, World Bank 2005, Ekaputri 2007, Ginsburg 2008, Bada and Madon 2010, Blake and Garzon 2010, Brown and Grant 2010, Byrne et al. 2011, Freeman 2013). This duality was made clear by Secretary General, Kofi Annan in an address to the United Nations in 2002 when he said, “The new information and communications technologies are among the driving forces of globalization. They are bringing people together, and bringing decision makers unprecedented new tools for development. At the same time, however, the gap between information ‘haves’ and ‘have-nots’ is widening, and there is a real danger that the world’s poor will be excluded from the emerging knowledge-based global economy” (Harris, 2004). These concerns are reflected in

the comments of Avgerou (1998) and Gerster and Zimmermann (2003) who point out that a scarcity of computers, telecommunications systems and technical skills as well as lack of associated policies and costs that discriminate against poor countries (Gerster and Zimmermann 2003) are common in impoverished nations and impose significant barriers to their utilization of ICTs for communication, information acquisition and dissemination.

Many of the activities of EcoCARE Pacific in Tonga are built on the premise that access to information provides knowledge and by doing so helps build capacity and capabilities in local communities. Thus, the establishment of infrastructure and services to enable information and communications technology are priority issues and consistent with the philosophy of Enpovigo that the enabling of people to make appropriate choices that fit within their local, regional and global contexts will improve well-being and individual happiness.

Enpovigo

As we have seen in earlier chapters of this thesis, contemporary theories offer a range of approaches that can be applied to development programmes many of which can provide individuals, communities or nations with successful development pathways in part or in their entirety. The philosophical approach I call Enpovigo provides the opportunity to identify appropriate approaches and enables them to be amalgamated or adapted to suit the specific needs and purposes of proposed development activities. The Enpovigo Development Strategy discussed below suggests that by accessing information through renewable energy-facilitated ICT usage should result in an increase in local and national capacity and that increased capacity will benefit the nation in a number of ways including economically.

Enpovigo is a word that originated from Esperanto, a politically neutral, constructed language that was first used in 1887. When translated into English, Enpovigo means 'empowerment'. In the context of this thesis Enpovigo is a development strategy that has its foundations primarily in the Capability Approach and Participatory Development and to a lesser degree in a wide range of other theories as outline in the introduction to this chapter. Enpovigo is designed to assist people to obtain knowledge that will increase their capabilities and will enable them to make informed choices with respect to development projects. A fundamental assumption of Enpovigo is that by accessing information through renewable, energy-facilitated ICTs, increases in local and national capacity should result, and in turn will have the potential to benefit the nation in a number of ways. I call this central tenet of Enpovigo 'the Enpovigo development strategy' and discuss its role in the context of development below. Another central premise of Enpovigo is that projects and programmes be selected in collaboration with members of recipient communities or countries and be in response to their needs. If a project is associated with an institution or some other entity that has its own restrictions or requirements, these must be discussed with project partners and introduced in part or in full during the design phase. Local and customary knowledge are also seen as vitally important to the Enpovigo approach to development and in combination with contemporary knowledge should enable unique solutions to be found to local, national and/or regional problems.

Operationally, the approach to development embedded in Enpovigo can be equated to a feedback loop and therefore has similarities to the processes making up the scientific method as envisaged by Popper (1963). The Enpovigo Information Based Feedback Loop (EIBFL) (Fig. 4.1) illustrates how appropriate choices of development projects can evolve from an initial 'unrefined' idea to a workable solution through continual feedback and subsequent adjustments

as potential approaches are worked through. Furthermore, by using the EIBFL during the course of a project its progress can be evaluated and refined.

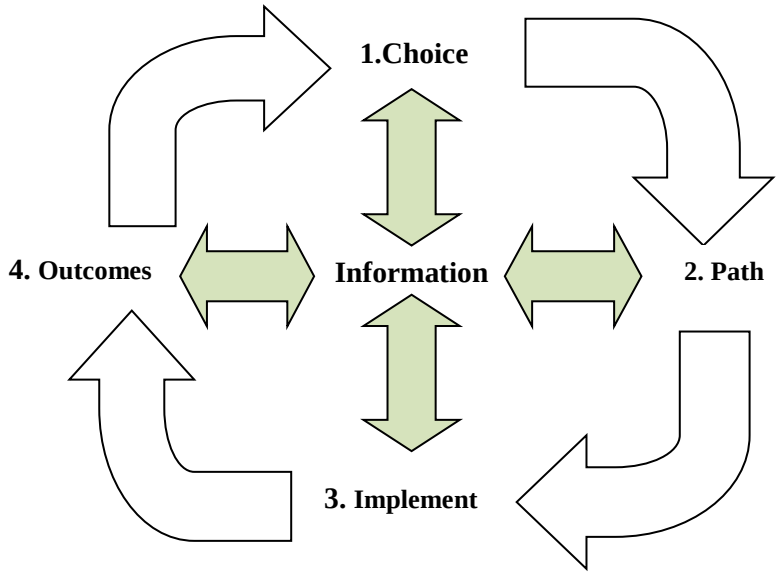

Fig. 4.1 The Enpovigo Information Based Feed Back Loop enables development pathways to evolve, adapt, change, or remain unchanged, to become sustainable, or to be discontinued depending upon the results of ongoing monitoring and evaluation.

The Enpovigo Development Strategy (EDS)

Underdeveloped nations primarily rely on foreign aid, loans, grants and remittances to maintain their economies and in these respects Tonga is no different (Mafi 2012). The Enpovigo Development Strategy (Fig 4.2) suggests there may be another way, at least in part. Thus, by accessing information through renewable, energy-facilitated ICTs an increase in local and national capacity should result, and in turn will have the potential to benefit the nation in a

number of ways, including economically. Consequently, a developing nation should decrease its reliance on foreign aid, loans and remittances over time. According to the EDS the process of development will advance in three main stages: activation, transition and realisation as shown in Figure 4.2 and expanded upon below.

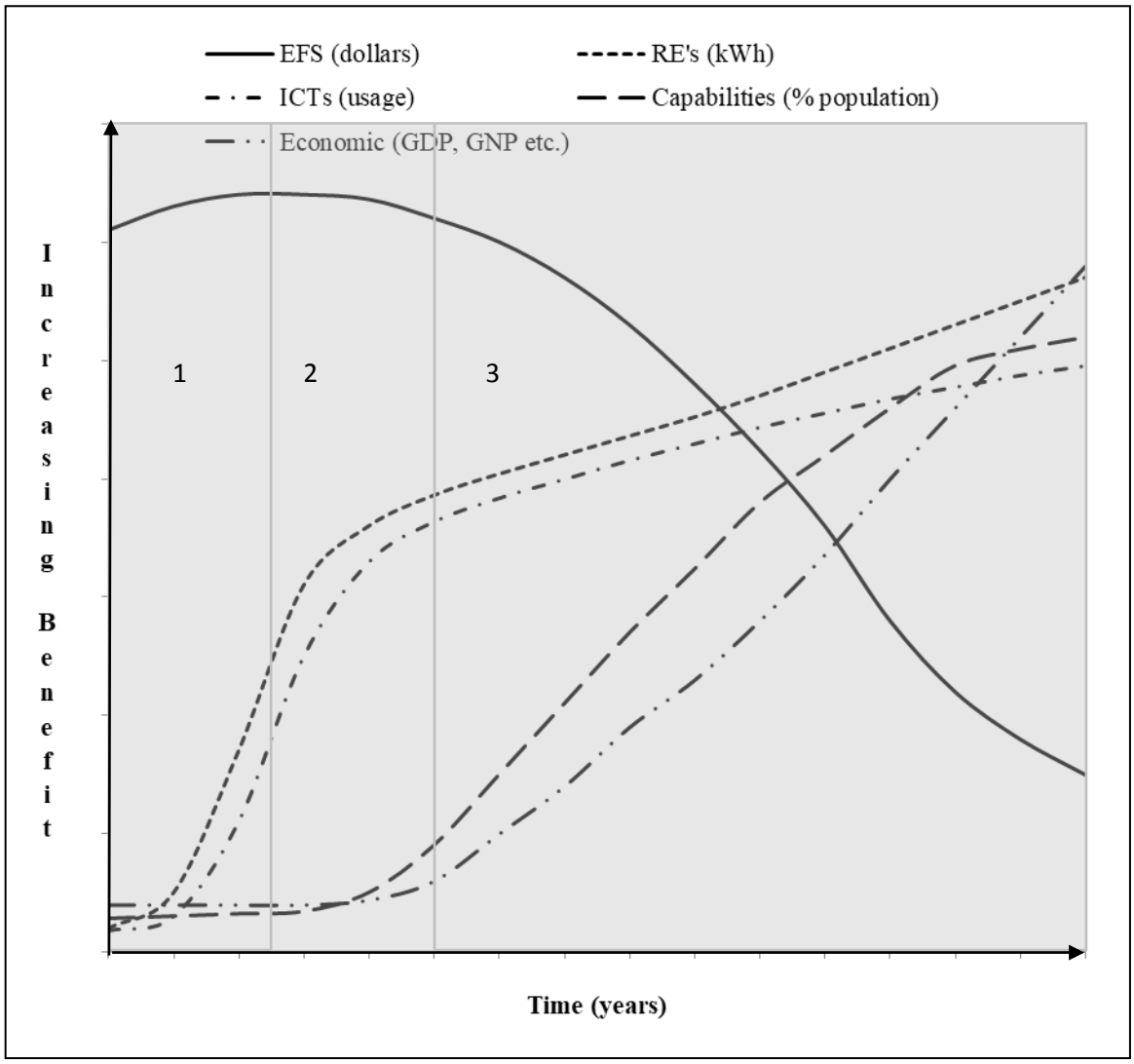

Fig. 4.2 A schematic representation of the course of development as proposed by the Enpovigo development strategy (EDS). The X axis shows increasing time in years and the Y axis increasing benefit. The three columns of

unequal width numbered 1, 2 and 3 represent the activation, transition and realisation phases of development, respectively.

Notes: benefits might be shown by economic indicators such as increases in GDP, increases in RE (renewable energy usage), or increasing ICT usage. Capabilities can be represented in terms of percentage of population.

Stages of development as proposed by the Enpovigo development strategy

1. Activation phase

The Activation phase requires an initial increase in funding from external sources and includes the installation, implementation and utilisation of renewable energies and ICTs.

- The initial increase in external funding during the purchase and installation of renewable energies and ICTs therefore results in the solid line in Fig. 4.2 ascending as the benefits of ICT usage in building capacity are yet to be realised.

- ICT utilisation follows the installation of renewable energies. During the Activation phase the lines representing ICTs and RE climb steeply, indicating significant renewable energy installation and ICT usage over a relatively short period of time. Significant funds are required to ensure that state of the art communications systems are available for the majority of the target population over a relatively short period of time.

- Capacity shows a slight movement upwards indicating some increase related primarily to training people to support the new infrastructure, particularly ICTs. Pertinent capabilities in the form of tertiary qualifications require more time to be achieved.

- Little or no economic benefit is seen while capabilities are beginning to be established during the Activation phase.

In summary, the Activation phase is a dynamic one when infrastructure is being established and skills are being acquired through virtual courses, degrees, trade qualifications and so on, all of which take time. The time taken for the Transition stage to be reached will depend upon the length of time individuals take to achieve their qualifications during the Activation stage. For example, it might take students 3-4 years to obtain a university degree in Electrical Engineering or to gain an electrical trade qualification, whereas it might take 2 years to gain a Master's Degree in Marketing and Business management, or three months to gain a qualification as an IT professional.

2. Transition phase

During the transition period the rate of establishment of renewable energy plants and ICTs can be expected to fall as capacity is achieved, while the numbers of new users of ICT should follow a similar trend. However, economic benefits can be expected to lag behind the establishment of new infrastructure and capabilities. Nevertheless, reliance upon foreign financial support should begin to slowly trend downwards. The length of the time lag between an improving economy and continuing reliance on foreign financial support will depend on a number of factors including the servicing of foreign debt. People who have gained skills and qualifications can be expected to use them in order to establish industries and other entrepreneurial activities, participate in E-commerce, and strengthen the economic basis of already established industries such as fisheries. In summary, the Transition phase is a period of change when the time spent building capacity during the Activation phase begins to have an impact.

3. Realisation phase

During the Realisation phase the nation's economy progresses upward, and reliance on foreign investment trends downward. This situation is seen in Fig.4 as a steep fall in the EFS curve and corresponding rises in the curves representing economic benefits and increasing capabilities. At the same time new ICT usage should become less pronounced but continue to grow as continuing improvements in technology attract more users and provide greater opportunities. It can also be expected that as a nation's economy continues to grow there will be increasing reliance on renewable energy sources, which will have to expand to cope with demand.

Happiness as a preferred outcome of development

Concepts of happiness and the pursuit of happiness as a goal of development programmes were introduced to the reader in Chapter 1. Briefly, there are two broad definitions of happiness, one the utilitarian definition, which is roughly equivalent to well-being, and the other the cognitive definition, which equates happiness with tranquillity. Both kinds of happiness can be perceived as objectives of development, or indeed both. Development activities are commonly seen as means to increase economic growth through the production of goods and services, which enable other goods to be purchased and standards of living increased. In this vein, the United Nations' Human Development Index (HDI) provides a measure of the social and economic development of countries by assessing life expectancy, education and per capita income. It does not purport to measure happiness per se. Nevertheless, the less tangible goal of achieving 'gross national happiness' is the stated goal of development in Bhutan (Chapter 1) and is championed as at least one important objective of development by authors such as Helliwell et al. (2016) and Sachs

(2016). Although the achievement of happiness is a somewhat imprecise or abstract objective of development, it is consistent with the stated objectives a number of economy-based theories of development. For example, Rostow's stages of economic growth model (Rostow 1960), suggests that countries 'want' to modernise and grow, and that societies are happy to agree to materialistic norms of economic growth or market-based neoliberal theories (Dumenil and Levy 2005, Harvey 2005). Because well-being is frequently equated with materialistic measures of living standards it is not surprising that the most common criteria used in surveys of happiness and satisfaction are also based on economics (Fleurbaey et al. 2008). An economic focus is consistent with the utilitarian definition of happiness and infers that benefits associated with positive economic outcomes should make recipients 'happy'.

If the attainment of happiness is to be an objective of development programmes, then developers need to know what makes people happy. At a very basic level one might assume that people will be happy if they live in an environment where they have plenty of food, shelter and access to fresh water, and have children who are also able to have these things. In other words we and our children can be 'happy' when we are able to live comfortably and have access to basic requirements of the kind listed in Maslow's Hierarchy of Needs (Maslow 1943). Some authors (Nauert 2006, Markus and Schwartz 2010) have argued that happiness also requires that we have freedom to make choices, but at some level making choices becomes unnecessary. For example, I might choose to travel into outer space and visit the moon. However, this option is not currently available and even if it were I anticipate that it would be very expensive and I would be unable to pay the fare. Does that mean I am no longer happy? At the other extreme an individual who lives in a poor nation where food is scarce might say, "I would like a tractor and plough so I can grow crops". However, the choice to have a tractor may be as unrealistic for him or her as a

trip to the moon is for me. I am not suggesting that freedom to choose is not an aspect of happiness for some people, but is it a requirement for all people in all situations?

Similarly, industry and commerce can increase national GDP and enable people to have jobs and receive income and governments to supply services like health care and education systems. People can also buy cars, computers, televisions, mobile phones, etcetera with the money they earn and these new possessions are expected to enhance their lives. Does this equate with happiness? According to the Easterlin Paradox (see below) increasing GDP does not in itself increase 'happiness'. However, that is not to say that an increase in GDP will not be a factor in enabling people to achieve happy and successful lives in some situations, or be a means to an end. I believe that to evaluate development and happiness solely using an economic criterion such as GDP is too narrow as it neglects other aspects of our lives that are influential in determining a good quality of life and therefore happiness. The conundrum of what is meant by happiness and how it can be measured is considered in more detail below.

Evaluating Happiness

Many authors (Clark and Oswald 2002, Frijters et al. 2004, Kenny 2005, Deaton 2008, Daly et al. 2011, Helliwell et al. 2016, Crabtree 2017) have suggested that economic indicators such as changes in GDP or GNP can be used to measure the happiness of a nation. In contrast, the Easterlin Paradox, formulated by Richard Easterlin, Professor of Economics at the University of Southern California, indicates that although wealthier people within nations may be happy, the populations of richer nations are not necessarily happier than those of poorer nations (Easterlin 1973). Furthermore, his studies showed that an increase in happiness was not found as income

continued to grow (Easterlin 1974). Easterlin used the term 'happiness' synonymously with subjective well-being, and his findings therefore reflect "…dimensions of well-being such as health, work, and family and social relations" that are missed in purely economic measures (Easterlin 2016).

Not all researchers have accepted the reality of the happiness-income paradox, and some have even claimed that the relationship is in fact positive (Veenhoven and Vergunst 2012, Easterlin 2016) Easterlin et al. (2010) countered this argument by saying the criticisms were based on a statistical artefact, or that they confused short-term relationships with a long-term ones. More recent data appear to confirm that for both poor and rich people in developed and developing countries world-wide, long-term (>10 year) trends in happiness and real GDP per capita are **not** significantly and positively related (Easterlin 2016). Interestingly, Easterlin's findings echo those of an earlier and longer-term study which found that although GDP of the USA more than doubled between the end of World War 2 and the early 1990s "…there was no empirical evidence of any improvement in perceived happiness" (Maddison 1991). If economic growth is unrelated to a people's happiness, or even if there is a weak positive relationship, one might reasonably conclude that development policy should focus more directly on things such as health and family life rather than on the escalation of material goods.

Almost two centuries ago, Jeremy Bentham the English philosopher and social reformer proposed that the "...goodness of an action should not be judged by the decency of its intentions, but by the utility of its consequences" and further suggested that we should aim for the "...greatest happiness for the greatest number" (Veenhoven 2004). Material possessions, strongly developed infrastructure, social welfare systems and so on do not necessarily equate to personal happiness (Veenhoven 2006) and it is revealing that surveys show that Scandinavian countries

with their generous family leave policies, low crime, free health care, rich economies and, yes, high income taxes, are consistently ranked amongst the happiest places on earth (Szalavitz 2011). Nevertheless, Scandinavian countries also have some of the highest suicide rates, and by inference not inconsiderable levels of unhappiness among their citizens. Similarly, a number of the richest and best resourced countries on earth have high suicide rates, (Eckersley and Dear 2002, Helliwell 2007, Easterlin et al. 2010, Daly et al. 2011, Szalavitz 2011, Titleman et al. 2013).indicating that having the best resources and facilities for their populations does not necessarily translate to a happier society (Daly et al. 2011). Indeed, Haybron (2011) commented that "…some societies can support high levels of happiness with extremely modest material holdings" and stated that "...the role of money in happiness [depends]…heavily on how we conceive of happiness".

Measuring happiness

As we have seen, happiness is difficult to define, so how might it be measured? In 1881 Francis Edgeworth, the Irish philosopher and mathematical economist, imagined a psychophysical machine he called a 'hedonimeter' being built to measure pleasure. Needless to say such a machine was not built and subsequent attempts to measure happiness have been imprecise at best (Haybron 2011).

More recently, numerous indices have been developed to assess happiness or well-being. Typically, they measure 'subjective well-being' a term coined by Diener (1984) to indicate surveys are based on self-reporting by individuals. Examples include the Gross National Happiness Index, the Gross National Wellness Index, the Satisfaction with Life Index, the World

Happiness Report, the Oxford Happiness Inventory, the Subjective Happiness Scale and the Panas Scale (Duncan 2005, Fleurbaey et al. 2008). Perhaps the best known index is the one used by the United Nations Sustainable Development Solutions Network to produce the annual World Happiness Reports currently edited by John F. Helliwell[62], Richard Layard[63] and Jeffrey Sachs[64]. The index ranks countries on a scale of 0-10 based on a single question that asks people to rank their satisfaction with life on scale of 0 to 10 where 0 means worst possible life and 10 means best possible life (Clifton 2017). Over 1000 adults in each of about 160 countries complete this annual survey although not all countries are included each year. In order to determine what factors contribute most to the index subsequent research by the editors examines the importance of six factors considered to be possible sources of happiness: GDP per capita, social support, healthy life expectancy, freedom to make life choices, generosity, and perceptions of corruption. The index effectively provides a comparative measure of quality of life around the world and most recently was topped by Finland (Helliwell 2007, Helliwell et al. 2016)

In contrast to utilitarian happiness, the cognitive or psychological definition of happiness indicates how we feel (Veenhoven 2006) and is seen as a state of mind that can be viewed as an 'emotional state' (Haybron 2011). According to Haybron (2011) the state of an individual's emotional condition as opposed to their well-being, offers greater "psychological depth" and is "...arguably deeper and more pervasive", leading to psychological happiness being a major source of "...pleasure and other good outcomes" (Haybron 2011).

[62] Senior Fellow at the Canadian Institute for Advanced Research and Vancouver School of Economics.
[63] Professor and programme director at the Centre for Economic Performance in the London School of Economics.
[64] Professor and director of The Earth Institute, Quetelet Prof of Sustainable Development and Professor of Health Policy and Management, Special Advisor to the UN Secretary General, Director of the UN Sustainable Development Solutions Network, co-founder and Chief Strategist of Millennium Promise Alliance, Director of the Millennium Villages Project and a Commissioner of the ITU/UNESCO Broadband Commission for Development

The Oxford Happiness Questionnaire is an ‘instrument’ devised to assess psychological well-being or cognitive happiness. It comprises 29 items each involving the selection of one of four options that are different for each item (Hills and Argyle 2002). The items consider aspects of self-esteem, sense of purpose, social interest and kindness, sense of humour, and aesthetic appreciation (Kashdan 2004) and thus differ greatly from the factors considered to be associated with the index used to produce the World Happiness Reports (Helliwell 2007, Helliwell et al. 2016)

Whether the same index can be applicable for assessing cognitive happiness in all countries or situations, is nevertheless a moot point as differing cultural norms can confound collected data (Haybron 2011). For example, the French might score lower than Americans in the same happiness survey, not because their lives are any worse than those of Americans, but because they may tend to be less inclined to express their happiness. Issues such as this argue against the use of absolute values in surveys taken by individuals to assess emotional (cognitive) happiness. Nevertheless, general, if imprecise, surveys can provide direction for further investigations or surveys that may be more extensive or strongly targeted. Where happiness is one desired outcome of development programmes it is imperative that surveys are appropriately designed for particular situations. For example, survey designs need to take into account cultural factors, language, literacy, logistical limitations, demographics and population distribution of the target group whose members also need to have a clear understanding of all terms used in a survey.

An instructive example of an index, albeit an environmental one, that was developed under a specific set of conditions but came to be used with variable success in other situations is New Zealand’s Macroinvertebrate Community Index (MCI) (Stark 1993). The MCI was designed to assess the ‘health’ of stony streams and rivers in Taranaki using the presence or

absence of different kinds of river-dwelling invertebrates that differed in their ability to tolerate organic pollutants. Despite being used successfully in Taranaki it became apparent that it did not provide an adequate evaluation of all New Zealand stream types. Consequently, the index needed to be modified for use in other regions, for muddy and sandy streams, and where contaminants were not organic (Stark and Maxted 2007, Gray and Harding 2012, Blakely et al. 2014).

Lessons learnt from use of the MCI, including the important lessons that 'one size does not fit all' and that criteria (scores) need to be weighted differently in different circumstances should also be applicable to the design of an index to measure the happiness of human populations. Such an index might be derived from a series of differently-weighted questions addressing criteria perceived to be related to utilitarian and/or cognitive happiness as required. For example, having a home or shelter might receive a higher score than owning a car; being literate would have a higher score than being illiterate; being at peace might score more highly than being at war, food security in the form of small holdings might receive a higher score than large scale farming; having a larger percentage of young people enrolled in a standardised education system would receive a higher score than having a smaller percentage; having access to safe, clean water would have a higher weighting than having access tainted or unsafe water; access to good health care would score highly; and increasing GDP that increases the average income of a community or population as a whole would score more highly than declining GDP and so on.

A numerical ranking system could be used to answer specific questions, and assuming that a suitably large, randomly-selected group were surveyed, general trends would be teased out of the data. Although a single summarizing index value could be calculated to allow temporal comparisons of community happiness to be made, the most useful information in the context of

development is likely to be the responses to the individual survey questions, and their contributions to ‘community happiness’. These responses can then be used as guide for future development.

Summary: Enpovigo and development

In this chapter it has been argued that capabilities are an essential aspect of the developmental processes and that the most appropriate method of information acquisition for remote island communities is through renewable energy powered ICTs. For sustainability to be built into development initiatives, local partners must participate strongly in both their design and implementation so that appropriate capabilities are built into local and national communities at all levels of society. The involvement of local people as volunteers, interns, contractors, postgraduate students or employees of relevant departments associated with development projects helps to build the relevant capabilities and therefore the likelihood that sustainability will be built into programmes. The philosophy of Enpovigo upon which projects involving EcoCARE Pacific Trust are based requires thorough and extensive planning of initiatives to ensure that the most appropriate actions are taken in any given situation and provides the direction behind successful capacity building. The combination of the Enpovigo Development Strategy and EcoCARE presents an example of how implementation of development strategies can help ensure that communities involved in these programmes are able to realise differing degrees of sustainable self-determination, the long term outcome being an increase in both utilitarian and cognitive happiness of communities.

Chapter 5. Case study: EcoCARE in Tonga

Introduction

In this chapter I introduce the reader to the kingdom of Tonga and EcoCARE Pacific Trust, which plays a vital role in expressing the Enpovigo development strategy through its ability to initiate and facilitate projects and programmes and catalyse relationships between individuals, communities, institutions, organisations and governments to achieve project outcomes. Although this case study deals only with Tonga where the activities of EcoCARE Pacific have been centred, it is important to realise that many Pacific Island nations are not only similar to each other in their geography but their populations also have numerous characteristics in common. Therefore, projects that produce positive outcomes for one Pacific Island nation may well bring positive benefits to others if the same or similar programmes are implemented in them. Recently, interest in the Enpovigo development strategy has also been expressed in other countries and EcoCARE Pacific is currently in the process of establishing branches in Norway and Ukraine. It is also anticipated that further EcoCARE branches will open in Kenya, Tanzania and possibly Cambodia before the end of 2019.

All Pacific Island countries apart from those in Melanesia and French Polynesia have fewer than 200,000 human inhabitants[70] and those in Micronesia and Polynesia have low cultural and racial diversity as indicated by the small number (1-6) of 'indigenous and 'introduced languages' found (CIA 2014). Most populations are also, for the most part, highly literate, with

[70] The population data presented for 19 Pacific Island Countries (Melanesia Micronesia and Polynesia) are derived from the United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2012 Revision. Source: http://www.worldometers.info/world- population/population-by-country/population/population-by-country/

all Polynesian countries[71] having literacy rates above 95%, Micronesian countries over 92% and Melanesian countries other than Papua New Guinea over 83% literacy (CIA 2014). In general, Pacific Island communities enjoy relatively good health and education infrastructures, basic needs such as food, water and shelter are met, and energy resources (wind, sun and tides) are abundant. Agriculture and fisheries offer immense economic potential to many Pacific Island nations (New Zealand Ministry of Foreign Affairs and Trade 2014).

The Kingdom of Tonga

Tonga is an island chain that stretches from Ata (an island in the Tongatapu Group) in the south to the Niua Island Group some 700 kilometres to the north. There are four distinct groups of islands (Figure 5.1). The most southerly Tongatapu Group consists of 74 islands and has about 70,000 inhabitants most of which are located in and around the capital city of Nuku'alofa; the Ha'apai Group north of Tongatapu has 51 islands and about 6,600 people; the Vava'u Group has about 41 islands and 15,000 inhabitants; and the two Nuia Islands have about 1,400 inhabitants[72]. Overall, the population of approximately, 105 000 people (who are living in 36 communities of varying sizes) makes Tonga the ninth most populated Pacific Island nation[73]. Tonga has 98-99% literacy, three indigenous languages and two introduced languages are spoken. The official languages are Tongan and English. Tonga is a constitutional monarchy with a parliament based in Nuku'alofa on the main island of Tongatapu. Its economy is based on agriculture, forestry and fisheries and there are few industries or commercial business activities.

[71] Except the Wallis and Fortuna Islands which have a literacy rate of 50%.
[72] Tongatapu is the name of both the main island and the most southern group of islands that make up the Tongan archipelago.
[73] Population data sourced from United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2012 Revision. Source: http://www.worldometers.info/world-population/population-by-country/)

As noted in Chapter 1 the Tongan economy relies heavily on aid and remittances and it has a large non-monetary sector. Handicrafts and a few small scale industries are the main contributors to the manufacturing, transportation, mining and telecommunications sectors, while Pacific-wide companies are the main sources of business[74]. Tonga's major cash crops are coconuts, yams, vanilla beans and squash; pigs, poultry, cattle and other kinds of livestock are raised for domestic consumption. Fish make up two thirds of Tonga's exports with tourism being the second largest contributor to the Tongan economy following remittances (https://theodora.com/wfbcurrent/tonga/). Over the past decade Tongan fisheries have been realising larger and larger economic rewards and in 2015 coastal and off-shore commercial fisheries returned over US$22 million[75].

[74] New Zealand based firm Tonkin and Taylor are one of the main engineering contractors in Tonga; Air New Zealand Air Cargo and Pacific Forum Line are the main international freight transporters; undersea mining is carried out primarily by Nautilus Minerals Tonga; Digicel Tonga is part of the Digicel Group and is the main competitor of the national telecommunications provider, Tonga Communications Corporation.
[75] Food and Agriculture Organisation of the United Nations. Source: http://www.fao.org/fishery/facp/TON/en#CountrySector-Statistics

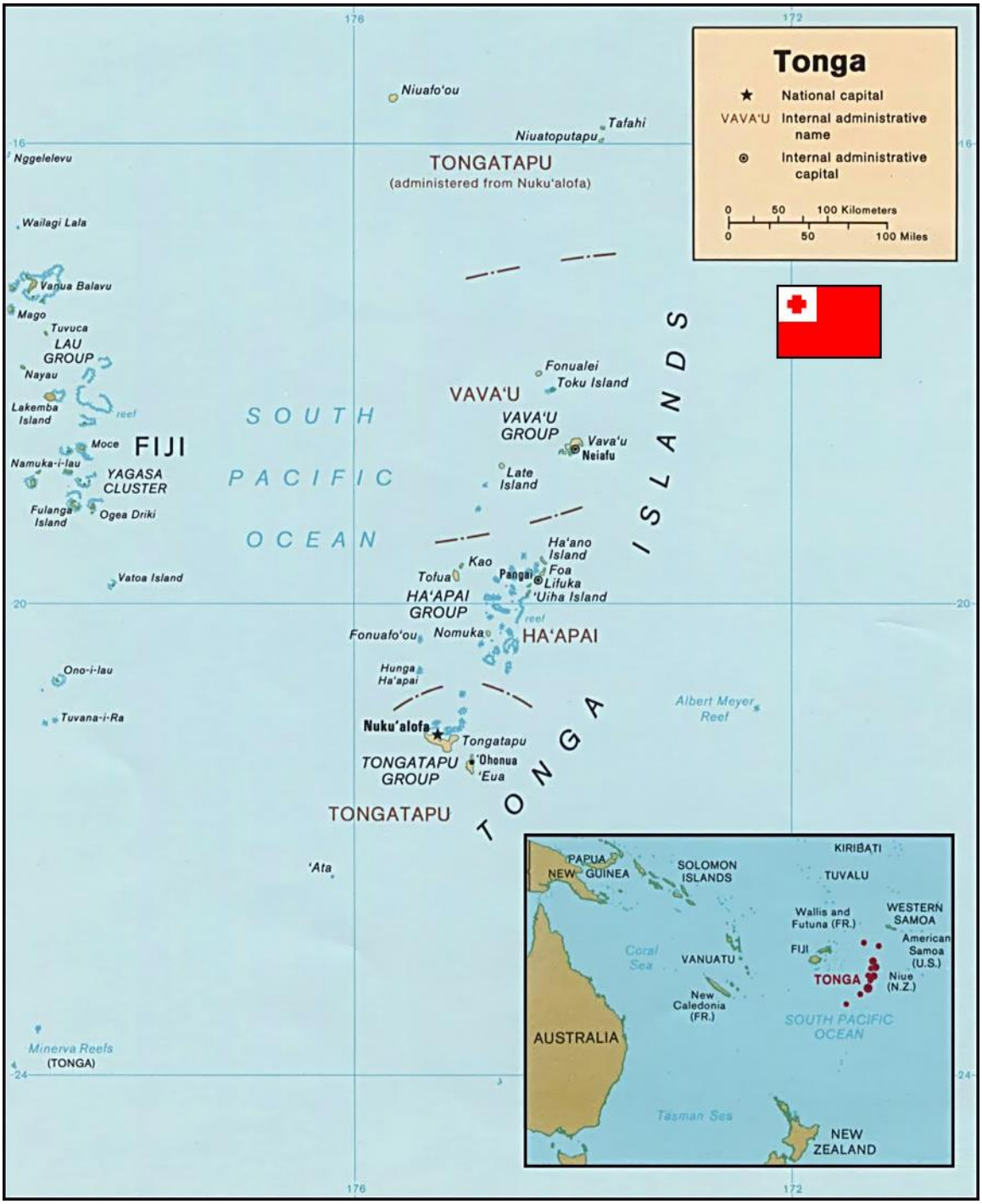

Figure 5.1 Map of Tonga with insert showing the distribution of the Tongan islands and the position of Tonga in relation to New Zealand, Australia and other Pacific Island nations. The source of the map is http://www.map-library.com/map-library/maps-of-australia-and-oceania/maps-of-tonga/.

As explained in Chapter 4 EcoCARE Pacific projects are designed to contribute to capability building through access to information. However, the geography and location of communities on the islands making up the Kingdom of Tonga present often difficult challenges for project design and implementation. Thus, in contrast to communities located on large land masses the relative isolation of islands raises connectivity issues and consequently the ability of their communities to acquire and share information. In general the 'poverty of isolation' increases with distance from Nuku'alofa and is especially acute in the Ha'apai and Vava'u groups of islands. The challenge imposed on island communities by oceanic isolation is shown by the following example. If small communities in Tonga were positioned on a single land mass, transportation of goods and services, the provision and maintenance of telecommunications, energy production and infra-structure, health services, education services and so on, would be relatively straight forward. The main town or capital could provide all the appropriate expertise and outlying communities could then be connected by road and cable with minimal maintenance being required by the outlying communities. However, this is not the case as the communities are located on islands surrounded by water. Therefore, they cannot be connected by cable (undersea cable connection is costly) or road and all freight and passenger services must be by ship or plane. Under these circumstances additional handling, transportation and associated costs are required for all items that cannot be produced locally. Electricity and/or broadband connections are not easily supplied from a centrally located and serviced main centre, and each island community must not only generate electricity locally, but they must also be able to maintain and sustain services locally. Traditionally, this has meant that remote island communities have used and continue to use diesel generators to produce electricity, thereby contributing to CO^2

emissions and making electricity both very expensive (TOP$1.00/kWh) and unreliable (Pandey et al. 2013a).

Communities remote from the capital city of Nuku'alofa and from the main island of Tongatapu are also unable to use broadband unless each community pays for an undersea cable connection. In Tonga the internet is accessed via satellites, which offer narrow bandwidth and allow only small amounts of data to be uploaded and downloaded. Satellite communication is also very expensive, and it costs about fifty times more to upload and download data in Tonga via satellites than in New Zealand using broadband (Woodward 2011). Finally, because satellite communications are responsive to atmospheric conditions they are highly variable, making internet communication unreliable for most activities other than phone communication (Woodward 2011). A consequence of these communication issues in an island archipelago is that conventional methods of dealing with connectivity require innovative solutions. These issues and their solutions form an important part of EcoCARE Pacific's activities in Tonga and are therefore dealt with at some length in this chapter.

EcoCARE Pacific Trust

EcoCARE Pacific Trust (a New Zealand registered charitable trust) was established in 2004 to initiate and facilitate projects and programmes that enable capabilities to be achieved by Tongans, in part through participation with relevant government ministries. Because it has an holistic approach to development through Enpovigo the EcoCARE board was chosen to represent numerous different skill sets. The original board included: Dr Timothy Phillips (Co-founder and Rural General Medical Practitioner), Dr Malakai Koloamatangi (Tongan national,

Political Scientist, Lecturer), Dr. Janine Bailey (Rural General Medical Practitioner), Dr. Andrew Catanach (Plant Molecular Biologist), Dr Jane Davidson (Evaluation Consultant), Lisa Pringle (Television, Director/Producer), Simon England (Lawyer) and Russell Taylor (Co-founder, Freshwater Community Ecologist).

Projects instigated by, or contributed to, by EcoCARE are discussed later in this chapter, but a broad aim of these projects is to develop skills and expertise among local communities, so individuals can enjoy happy lives. As indicated above, EcoCARE also emphasises the importance of enabling access to information in order to obtain knowledge that will result in the development of appropriate expertise and capabilities across a wide range of disciplines. Hopefully, the outcomes of these activities will also contribute to the increasing well-being and happiness of communities. In summary, EcoCARE Pacific was established to act as an interface between the resources available in developed nations and the resources, and needs required and identified by recipient nations, in this case Tonga, in order to enhance their well-being and happiness.

The formation of EcoCARE Pacific Trust has facilitated the expression of the Enpovigo development strategy outlined in Chapter 4. In part, EcoCARE's approach is a response to the fact that many funds made available for development activities, for example by the New Zealand Ministry of Foreign Affairs and Trade, Sustainable Development Fund, effectively exclude participation of tertiary institutions because of their unacceptably high overhead charges that must be included in budgets. Acting alongside institutions and organisations, EcoCARE can access funds from NGO-only sources and so support the needs of individual researchers, volunteers, interns and contractors while receiving 0-15% overhead charges from the fund. In the case of universities this means that a researcher or group of researchers can supervise one or

many postgraduate students working in a country such as Tonga and EcoCARE need only support the travel, accommodation, living expenses and consumables, and receive minimal overheads. Second, the institution/EcoCARE relationship enables institutions such as universities to obtain student fees, publications and credibility from research programmes, while the recipient community, nation or region gains necessary information and capabilities related to the issue or issues being addressed. Third, and probably most appealingly for impoverished nations, instead of using consulting firms that charge large fees and carry out minimal educational activities, the EcoCARE model offers multiple benefits in the form of sustainability and the development of capabilities in local communities, as well as the kinds of benefits offered by consulting firms.

In an attempt to develop capabilities and ensure a degree of sustainability within programmes the Trust prefers that mentors, tutors and researchers supervise postgraduate students, interns and other volunteers who may be local, national and/or regional citizens of the recipient nation or nations. Tongan students who have received scholarships to attend New Zealand universities received stipends during the course of their programmes, and the terms of their contracts stipulate they should be contracted to work in Tonga for 5 years or more post-graduation. This means that the knowledge they gain from their experience as a postgraduate student will be retained by their home nation and should support the sustainability and ongoing benefit of their overseas educational experience. EcoCARE programmes involving students also typically include an extensive outreach component whereby the students and their supervisors participate in communicating project aims and results to the wider community through public presentations, news interviews, reports and peer reviewed journal articles. Reports and articles on projects supported by EcoCARE are made available at www.ecocare.org.nz.

In essence, EcoCARE Pacific is able to act as an interface between the needs of communities, nations and regions and the institutions and organisations that are able to address their needs. To date, EcoCARE has accessed grants and funds for projects and programmes in the areas of health, education, energy production and the environment for the communities of Pacific Island countries most notably the Kingdom of Tonga, and will continue to do so. This is admittedly a wide brief, but because EcoCARE operates in an holistic manner driven by the philosophy of Enpovigo, and because of its open and inclusive modus operandi, it is able to assist in mobilising the enormous diversity of expertise housed in tertiary institutions as well as in local and international volunteer organisations. Through application of the Enpovigo development strategy EcoCARE has been able to achieve successful outcomes in a variety of project topic areas. Because of the extensive amount of time that has been spent by EcoCARE representatives observing and participating with local Tongans, they have come to be able to speak to members of communities candidly, and in doing so they become aware of the real needs of communities, schools and the nation. Although Tongan social structure is strictly adhered to by the people of Tonga, EcoCARE representatives are not constrained by the standard bureaucratic requirements of hierarchical application and approval for meetings with Ministers, church leaders or members of communities. Rather they are free to make approaches to individuals and organisations thereby enabling EcoCARE to negotiate its position, accordingly.

To attain initial credibility representatives of EcoCARE firstly sought the support of University of Canterbury academic staff and departments. Three colleges and 75 individual academics offered support and agreed to be listed as advisors. This gave the Trust a huge amount of confidence because by agreeing to be listed as supporters and/or advisors to EcoCARE the

academics and colleges were saying that EcoCARE could be trusted not to jeopardise their good names and global reputations.

Subsequently, members of the EcoCARE board met with the Tongan Minister of Health and Environment, the Deputy Prime Minister and the Cabinet of Tonga (Figure 5.2) and the New Zealand High Commissioner in Nuku'alofa, all of whom endorsed EcoCARE Pacific Trust to act on their behalves to initiate, facilitate and access funds for projects and programmes that would be of benefit to the people of Tonga (Appendices 1, 2, 3 and 4). The nature of EcoCARE's approach appealed to the Tongan politicians as it emphasised the expectation that knowledge and expertise would be made available to Tongans, not only to address specific issues but to build local, national and regional capacity and capabilities through education and internships. Furthermore, although board members knew there were significant issues surrounding resource availability they were concerned that EcoCARE not be seen as an organisation that 'thinks it knows best' and ends up collecting and distributing goods that are not really necessary. Hence, the 'participatory approach' became an important aspect of all its activities. Extensive discussions and collaborations with government ministers, church leaders and members of local communities have been a central component of the participatory approach of EcoCARE in Tonga since 2006 when the first shipment of educational goods was sent to schools in Tonga.

Figure 5.2 Members of the cabinet of Tonga and members of EcoCARE. Present in the back row and from the left are Dr. Malakai Koloamatangi (EcoCARE Trustee), Mrs Elisapesi Koloamatangi, Dr Timothy Phillips (EcoCARE Co-founder), the Honourable Dr. Tevita Palefau, the Director of the Water Board, the Director of the Ministry of Finance and Mr Russell Taylor (EcoCARE Co-founder and CEO). Present in the front row and from the left are Dr Janine Bailey (EcoCARE Trustee), the Honourable Deputy Prime Minister Cecil Cocker, the Honourable Lord Tuita, the Minister of Labour, the Director of the Ministry of Justice, and the Prime Minister's Executive Assistant.

EcoCARE projects in Tonga

Since 2005 EcoCARE has instigated or been involved with 19 initiatives associated with its involvement in Tonga (Table 5.1) many of which continue. Most projects can be categorised as being in two main areas, education, and energy and communication technology, whereas others have been in the fields of health, water quality and fisheries management. Funding for projects has been obtained from a wide range of sources, principally in New Zealand and Tonga. Notable funders have been the New Zealand Ministry of Foreign Affairs and Trade, the Critical Ecological Protection Fund, Nautilus Minerals Tonga, colleges, centres and departments of the University of Canterbury, New Zealand, and Rotary Clubs in New Zealand and Australia. Self-

funded volunteers have also contributed in the educational sector. Below I outline and evaluate a number of the larger projects.

Table 5.1. Projects and project-associated initiatives involving EcoCARE in Tonga and their principal funding sources.

Project/initiative	**Dates**	**Funding sources**
Educational initiatives		
High school science competition	2009- 2017	Nautilus Minerals Tonga; University of Canterbury; University Book Shop, Christchurch
Scholarship programme	2010-2016	College of Science, University of Canterbury
Catering scholarship	2010-2016	Compass group, New Zealand
Accommodation scholarship	2010-2016	Campus Living Villages, New Zealand
Rotary accommodation scholarship	2015	Rotary Club of Riccarton, New Zealand
Library book donation scheme	2007	Individuals, 4 New Zealand schools, Nautilus Minerals Tonga
Volunteer teachers	2007-present	Self-funded, supported by the Ministry of Education and students are hosted by the schools into which they have been placed
Education evaluation project	2012	National Centre for Research in Europe, University of Canterbury
Energy and communication Technology		
Solar panel pilot project for schools	2008-2009	New Zealand Ministry of Foreign Affairs and Trade (NZMFAT); NZMFAT High Commission in Tonga; Engineers Without Borders (University of Canterbury and Auckland University); Air New Zealand; Virgin Pacific Airlines; Ministry of Education, Women's Affairs and Culture Tonga; Vava'u High School and

		Tonga College
Advanced solar panel project for schools	2010-2012	NZMFAT Sustainable Development Fund; Rotary New Zealand World Community Service; Wireless Research Centre, University of Canterbury, The Prime Ministers Office and the Ministry of Energy
Decommissioned computer donation scheme	2006-present	Individuals, recipient schools, Nautilus Minerals Tonga, Christchurch City Council, the Ministry of Education, Women's Affairs and Culture (Tonga)
Renewable energy evaluation project	2013	National Centre for Research in Europe, University of Canterbury
Feasibility study for the establishment of a wireless communication network for Tongan schools	2011	Wireless Research Centre (University of Canterbury), Ministry of Education, Women's Affairs and Culture (Tonga), Tonga Communications Corporation and the Ministry for Information and Communications Technologies.
GIS mapping project	2009	College of Engineering, University of Canterbury
Other projects		
Safe water systems	2007-present	Rotary clubs in New Zealand and Queensland, individual donors and the Canterbury Club of Christchurch.
Provision of health resources	2005-present	Individual donations, recipient schools, Nautilus Minerals Tonga, Ministry of Health (Tonga)
Fisheries management	2009-present	School of Biological Sciences, University of Canterbury, Ministry of Fisheries (Tonga)
Disease vector (mosquito) research project	2007-2009; 2013-2015	Critical Ecological Protection Fund[76]; School of Biological Sciences, University of Canterbury; Meadow Mushrooms, New Zealand

[76] The Critical Ecosystem Protection Fund is a joint initiative of L'agence française de développement, Conservation International, the European Union, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank.

a. Educationally aligned project

Provision of computers and other educational resources

One of the first projects undertaken by EcoCARE was to facilitate the acquisition of knowledge by people living in remote island communities in conjunction with the Ministry of Education in Tonga. More specifically, books, computers and other materials were distributed to government schools and Christian mission schools on the main island of Tongatapu and on the more remote Ha'apai and Vava'u groups of islands. In 2006 the first shipment of goods to the Ministry included 104 decommissioned computers donated by the University of Canterbury and books donated by the Christchurch City Council. It had been determined that desktop computers that had been used by corporations and institutions and were no more than 7 years old would be suitable for use in schools as they have a number of attributes that help ensure their ongoing usability:

1. They are most likely networked and have network cards on board.
2. They are most likely the same make and model, a factor which offers a considerable number of benefits;
    a. Students can move between them without having to learn how to use a different computer with differing operating system and idiosyncrasies.
    b. When a computer breaks down it can be put to one side and cannibalised to keep other computers going.
3. When the computers are older they can be transformed from stand-alone desktop machines to networked work stations connected to a new computer, which would act as a mini-server via a 24-port network switch.

In 2008 it became apparent that although EcoCARE had sent many hundreds of computers to Tongan schools, students in some communities were restricted in their use because of the inhibitory cost and unreliability of electricity. Furthermore, for anyone living outside the capital city of Nuku'alofa, which received a broadband cable in 2012/2013, the internet could only be obtained via satellite[77], and as mentioned earlier, satellite communications are very expensive and unreliable. Nevertheless, after considering other options[78] it was concluded that Information and Communications Technologies (ICTs) still represented the best educational tool and the best way for communities away from the capital city and those on remote islands to obtain and exchange information. However, because ICTs are energy hungry, it was clear that the energy issue mentioned earlier needed to be addressed to improve accessibility if ICTs to a wide range of schools and island communities. How this issue has been addressed is discussed later in this chapter. Despite these setbacks the collection and distribution of educational and health resources including computers has remained a fundamental aspect of EcoCARE's activities and has been enhanced by the establishment of a partnerships between EcoCARE, New Zealand and Australian based Rotary Clubs, private donations, private industry (Air New Zealand and Virgin Pacific), the New Zealand Military Transport Division and a local Tongan company to help fund the shipment of goods to Tonga.

Students as Teachers

[77] A broadband cable was laid and connected at a point on the main island of Tongatapu in August 2013 http://www.worldbank.org/en/news/press-release/2013/08/21/high-speed-broadband-goes-live-in-tonga, however, broadband is only beneficial to the people living in Nuku'alofa on the main island. It is not of benefit to anyone living outside of Nuku'alofa or on any of the other 35 inhabited islands.

[78] These options included; establishing libraries, training more teachers, and offering scholarship programmes.

Many schools in Tonga lack teachers with specialist knowledge in various subjects including science. This shortage means that teachers will often be taking classes on subjects about which they have no formal qualifications. Not surprisingly, the combination of lack of formal teacher training in specific subjects and a paucity of educational resources has limited the levels of achievement that could be attained by many students. In an attempt to help alleviate this problem, representatives of EcoCARE instigated discussions with the Tongan Minister of Education and some ministry of education staff. It was agreed that a programme would be initiated whereby interested tertiary students in New Zealand would be invited to travel to Tonga to teach at high school level within their areas of expertise. Teaching applicants were required to provide the Tongan Ministry of Education with a résumé, so it could assess their suitability and to determine their fit with a particular topic and school. In particular, it was hoped that some student teachers would be placed into schools on the outer islands where the Ministry had found it especially difficult to place trained teachers. Student teachers are self-funded and fly to Tonga where they are taken to their appointed schools by Ministry representatives. The selected schools accommodate the students in a visitor's house on the school campus, or they are billeted with a member of the school staff. They also bring text books and other educational resources sourced by EcoCARE for use in Tongan schools as a form of koha[79] for the host schools.

The students teach years 9 to 13 classes and often perform a variety of other tasks, notably providing assistance with IT networks and computer lab-based issues. Before students travel to Tonga current versions of two "freeware" antivirus software programs, Avira (Avira Operations GmbH & Co) and Spybot-Search and Destroy (Safer-Networking Limited) are made

[79] Koha is a New Zealand Maori custom and may be defined as being a gift, present, donation, offering or a contribution. It is also a sign of respect.

available to them. They are also taught how to clean a school's computer and internet system and are asked to develop a maintenance schedule for the school's IT resource 'manager'.

In 2008 Matthew Stouffer, a student from the Civil Engineering Department, University of Canterbury taught mathematics and technical drawing at Vava'u High School in Tonga, and after a few weeks noticed that the school had flooding issues during significant rainfall events. Utilising his background in civil engineering Matthew was able to design an effective storm water system and in collaboration with local people and students and staff of Vava'u High School it was established during his three-month placement. Tom Swan, an undergraduate in the School of Biological Sciences at the University of Canterbury also travelled to Tonga as a volunteer teacher at Tonga High School, where in addition to his classroom duties he was involved with the design and implementation of an athletic training schedule for students. Tom subsequently completed a BSc degree and then undertook research on invasive mosquitoes and mosquito-borne diseases in Tonga for his Master's degree (Swan 2015). Matthews's and Toms stories provide good examples of the ways that volunteer teachers have contributed to schools and their communities and in return have had their own lives enriched by their experiences. The success of the student teacher programme is indicated more formally by the fact that the Ministry of Education in Tonga continues to support it.

Establishment of a High School Science Competition

In 2008 EcoCARE proposed that a science competition for students at all 36 Tongan high schools be established with the following objectives:

1. To encourage scientific pursuits by both teachers and students

2. To encourage the pursuit of formal scientific methodologies, e.g., the establishment of hypotheses, model testing, and the use of experimental processes and procedures
3. To improve and encourage the use of scientific apparatus
4. To improve scientific writing and critical analyses
5. To identify students with exceptional scientific capability.

The competition was open to all students in Forms 5 (Year 11), 6 (Year 12) and 7 (Year 13) of any Tongan school (single sex, co-educational, government or religious) and takes the form of an evaluation of science projects undertaken by individual students under the guidance of their teachers. A booklet produced by (Taylor 2008) was given to teachers in Tonga to assist them with project design, experimental procedure, and report writing, including the correct way to cite reference material. The projects are presented as formal scientific reports, approximately thirty pages long and must include an introduction as well as methods, results and conclusions sections. Citations need to be included in the text and referenced properly in a bibliography. The scientific reports are collected from schools by the Ministry of Education in Tonga and posted to Russell Taylor of EcoCARE Pacific Trust. He then distributes them to three academic staff and/or postgraduate students who have volunteered to assess them at the University of Canterbury. Thirty to 40 projects are normally assessed each year with the top three being awarded prizes.

Prizes have included microscopes donated by the Forestry and Geology Departments of the University of Canterbury, dictionaries, novels and reference books from the University Book Shop (UBS) at the University of Canterbury, and certificates, pens and sundry items donated by the University of Canterbury. In 2010, as a further incentive for students to study science, particularly the environmental sciences, EcoCARE negotiated with Nautilus Minerals Tonga

(NMT) to establish an annual TOP[80]$10,000 science fund. From this sum NMT agreed to award three TOP$500 prizes to the winning student projects, TOP$200 to the teachers of the winning student projects and the remainder to go towards a container of resources for the schools of the winning students. NMT increased the TOP donation to $15,000 in 2012 with any excess being available to be used for other education-related ends by EcoCARE with the approval of NMT. For example, as a result of negotiations between EcoCARE and NMT in 2013 EcoCARE was able to supplement the accommodation budget of a Tongan postgraduate student, Maketelana Male[81], who was studying for a Master of Science degree in Molecular Biology at the University of Canterbury.

Although the Science Competition ended in 2017 due to cuts to funding of NMT from their parent organisation, a number of important conclusions were able to be drawn about education in remote Tongan island communities during the eight years the science competition ran. Firstly, the quality of project work in schools that had winners of the science competitions was significantly better than that from students attending other schools. Secondly, regardless of added incentives in later years, students from the same four schools[82] continued to be successful in the science competition. Initially, it was suspected that financial rewards alone would motivate students, teachers and their schools to do well in the science competition and result in an improvement in quality of project reports received from all schools. However, this was not the case, suggesting that if teachers taking science classes do not have adequate experience, background or understanding of scientific protocols, no amount of incentive is able to improve

[80] TOP is Tongan Pa'anga and at the time of writing (5 July 2018) TOP$100 would buy NZ$62.21 (https://www.westpac.co.nz/agribusiness/international-business/currency-converter/#buyMode=RateTTBuy&fromAmount=100&fromSymbol=TOP&toSymbol=NZD&tc%5B%5D=TOP&tc%5B%5D=NZD).

[81] Maketelana Male was one of the three winners of the 2010 science competition and recipient of the second University of Canterbury, College of Science, Pacific Scholarship.

[82] Tonga High School, Vava'u High School, Tonga College and Queen Salote College.

the quality of student reports. Consequently, other ways of enabling teaching and learning quality appear to be needed so that students in all Tongan high schools can benefit. One potential solution, at least in part, could come in the form of renewable energy powered wireless communications systems that will enable nationwide communication and the sharing of educational resources as discussed later in this chapter.

Establishment of a College of Science Undergraduate Pacific Scholarship Programme

In 2005 following a visit to Tonga by three members of EcoCARE and Professor Malakai Koloamatangi[83] who was then a research associate at the National Centre for Europe, University of Canterbury, the Tongan Minister of Education Women's Affairs and Culture approached the Vice-Chancellor of the University of Canterbury requesting that closer ties be developed between the Ministry and the university. In taking this initiative EcoCARE was beginning to address the issue of Pacific Island students having the poorest completion and success rates of any ethnic group at universities in New Zealand. One result of this approach was that the College of Science, University of Canterbury, in collaboration with representatives from EcoCARE, agreed to make available a full undergraduate scholarship to selected Tongan students who had been successful in the Tongan High School Science Competition. In 2005 international student fees were NZ$18,000 per year and EcoCARE proposed that the college make available NZ$25,000 per year (an amount that was increased to NZ$30,000 in 2010) for 4.5 years/scholarship, to cover fees and other course-related expenses. To assist with accommodation and catering costs EcoCARE negotiated with Campus Living Villages[84] (the

[83] Professor Koloamatangi is the current Director of the Pacific Directorate at Massey University.
[84] Campus Living Villages have their headquarters in Sydney, Australia.

accommodation provider) and the Compass Group[85] (the catering provider) to provide additional scholarships for the scholarship winners.

Two sets of criteria were used for selecting scholarship awardees. The first set related primarily to the circumstances of the applicants:

1. The student must be a Tongan national
2. There was a strong probability that the student would return to Tonga post-graduation
3. The student should come from a family that would not otherwise be able to afford to send their child to attend a high quality institution outside Tonga. We reasoned that children from rich or elite families often had numerous options available to them whereas children of poorer families seemed more likely to maximise the benefits that this opportunity that has been offered to them.

The second set of criteria was designed to provide an insight into the academic abilities of applicants:

1. Students must have entered the Tongan High School Science Competition (this gave some idea of the quality of the students' scientific approach and abilities)
2. They would have a live interview in Tonga (the live interview identified the students potential ability to communicate with lecturers and other students at the University of Canterbury)
3. They would have a very good academic record as indicated by end of year results in the Cambridge International Examinations (academic capability is required to meet student entry requirements and is indicative of potential academic success)
4. They would write a two page essay on why they wanted to receive the scholarship (indicative of the ability to communicate in written English)
5. A teleconference would be held with the top three applicants before a final decision was made. (although the phone call was a matter of courtesy it was also to assess the students ability to communicate in English)

[85] Compass Group is a British multinational contract food service company headquartered in Chertsey, Surrey, UK. It is the largest contract food service company in the world.

All applications for the University of Canterbury, College of Science, Pacific Scholarship were assessed according to the second set of criteria listed above using a selection matrix[86]. The matrix was designed to indicate which candidate might be expected to be most successful as a BSc student at the University of Canterbury. In 2008 Emma Puloka of Tonga High School was one of the winners of the High School Science competition and in 2009 became the first recipient of the Pacific Scholarship. Emma went on to obtain a BSc and then an MSc in Environmental Sciences and Education and is currently a PhD candidate in the College of Education researching the use of contemporary and indigenous knowledge in science education in Tonga.

In 2010 a female student from Vava'u High School was offered the scholarship using different selection criteria but was unable to adapt to life at the University of Canterbury and her scholarship was withdrawn after 6 months when she returned to Tonga. However, the following year Maketelana Male was selected, again using the matrix criteria, and has now obtained a BSc and an MSc which included a thesis entitled the 'Identification of CRESSA DNA viruses in faeces of Pacific flying foxes in the Tongan archipelago' (Male 2016). She is currently a PhD candidate at the University of Newcastle in Australia where she is doing further viral research.

Despite the successful academic achievements of two of the three Tongan students who received Pacific Scholarships, the University of Canterbury decided to discontinue them and use the money for other purposes.

b. Power generation and the enhancement of communication capacity

[86] The University of Canterbury Pacific Scholarship selection matrix enables each candidate to be given a grading from 1 to 5 (with 1 being the lowest and 5 the highest) for each of 5 criteria: quality of their report in the science competition, interview score, academic record, written essay on why they think that should receive the scholarship, and telephone interview. The candidate with the highest accumulated total is ranked top.

Introduction

Electricity is generated in Tonga primarily by diesel generators that supply a local power grid similar to those found in most isolated third world communities. Fuels, including diesel are transported to Tongatapu (the main island in Tonga) by ship from Singapore. Diesel is then off-loaded into storage tanks in the capital city Nuku'alofa and trucks transport the fuel from there to other communities on the main island. Communities on outer islands are supplied by shallow-drafted vessels that have diesel pumped into their on-board tanks in Nuku'alofa and then leave for ports in the Ha'apai and Vava'u groups of islands. From these ports diesel is pumped into fuel tankers for distribution around the main island, or into 20 litre drums to be taken by smaller boats to communities on the outer islands. Clearly, these are transport and labour intensive procedures. Thus, the added cost of transportation to outer island communities means that the cost of generating electricity using diesel generators can vary from TOP$0:84/kWh to well over TOP$1:00/kWh in a country where the Gross National Income Per Capita (GNI) was only US$4,524.30 in 2012 (UNData 2014). The high per hour kilowatt charges inhibit the use of electricity to non-essential services and restrict the use of ICTs.

On top of the restrictions in ICT usage imposed by the per kWh charges are costs and associated issues related to accessing the World Wide Web on remote islands. Thirty six of Tonga's islands are inhabited, but schools on 21 of them receive no benefit from the broadband cable, which has connected Nuku'alofa with Fiji since August 2013. Isolation is therefore a significant barrier for communities, schools and hospitals on many of the outer islands and combined with the expense and unreliability of power generation restricts their ability to benefit from ICT. Additionally, there is an extensive lack of capability to manage and maintain communication technologies in 90% of communities.

EcoCARE'S electricity generation project

The restrictive nature of the existing power generation environment in Tonga has needed to be addressed particularly so people including students can use electric lights at night (sunset in Tonga is between 4:30 and 6:30 pm) and use refrigeration to preserve food and drink. By providing a service that is taken for granted in most first-world countries members of local communities will also be able to realise the potential benefits of Information Communication Technology (ICT). Addressing these goals requires innovative approaches combined with in situ experience, collaboration and participation between parties at many levels of society. This is particularly important in a country whose people are largely lacking in familiarity with technology and many of whose communities are isolated from each other by sea. Consequently, rather than being able to centralise technologies (and by implication maintenance) and the expertise and resources required to ensure ongoing sustainability, many communities need to develop local capabilities to ensure on-going power production and ICT usability.

To begin to achieve these goals, expertise within institutions and organisations outside Tonga has been called upon, notably the University of Canterbury, with respect to issues requiring technical and engineering-based solutions. Questions these 'outside experts' were asked to address in the first instance were:

- What would be the most appropriate, easily available method of producing energy that might be able to sustainably address the needs of remote island communities?
- What would be done with the energy once it has been produced?
- Could students, interns and contractors successfully carry out the design, procurement and installation of introduced technologies?
- Would the newly implemented technologies be sustainable over the long term?

Preliminary mapping project

In 2008, with authorisation from the Ministry of Lands in Tonga, I obtained a copy of the GIS data Landcare New Zealand had produced in a survey of Tonga commissioned by the Tongan Government. With the permission of the Ministry, EcoCARE was able to mentor and help supervise two postgraduate students from the University of Canterbury who were engaged to build an energy profile of Tonga to identify what energy sources and energy generation technologies were suitable for use in the country (Table 5.2). The students were asked to identify factors related to potential power generation technologies, including sizes of communities and relevant physical and other environmental factors. They were also asked to evaluate the potential use of small, medium and large wind turbines, their recommended life spans, needs for battery replacement, wind speeds and adjustments for variations in fossil fuel costs. An important outcome of this project was the realisation that the most appropriate energy solution for a particular place was likely to be determined by specific factors associated with its location and the availability of 'servicing' expertise in the local community.

In general, it was found that solar panels which can be attached to the local power grid were robust and because they have no moving parts should require the least amount of maintenance. They therefore have the potential to provide small, remote communities with a long-lived form of power generation. Small to medium-sized wind turbines were also efficient, despite having numerous moving parts and being susceptible to cyclones, and were considered to be realistic methods of generating electricity on the windward sides of islands. However, wind turbines require regular maintenance, which requires community-based expertise, if they are to remain functioning for long periods of time.

Table 5.2 Comparisons between eight common sources of energy production. Values from 1-10 are given in each cell in the matrix, with 1 being the best and 10 the worst score. The best overall option is that with the lowest total score. Based on these criteria solar photo-voltaic panels (solar panels) with an aggregate value of 35 were best and diesel generators worst with an aggregate value of 57. The higher values given to battery storage systems reflected the current battery technologies, their high maintenance requirements and need for replacement after 7 years of usable life. The subheadings "Off" and "On" for Solar Panels and Wind Turbines refer to whether the system is "On-grid", i.e., connected to the local electrical grid, or "Off-grid", i.e., using a battery storage system and not connected to the local electrical grid.

	Solar		**Wind**				**Hydrogen**	**Diesel**	**Hydro**	
Variables/Energy Production	**Panel**		**Turbine**		**Biodiesel**	**Biodigest**	**Conversion**	**Generator**	**Electric**	**Geotherm**
	Off	On	Off	On						
Installation Setup Costs	4	3	5	4	6	6	6	7	9	9
Sustainability (low is best)	4	3	5	3	2	2	4	7	4	4
Maintenance (time and effort)	7	3	7	4	7	7	7	7	7	7
Transportability of Energy	4	7	4	7	3	7	3	3	7	7
Fuel Costs	2	2	2	2	2	2	2	8	2	2
Life of Technology	6	6	6	6	6	6	6	6	9	8
Skills Required (maintenance)	6	4	6	6	8	8	8	8	8	8
Continuity of Supply	7	7	7	7	7	7	7	3	7	7
Pollutants Produced	5	3	5	4	7	7	7	8	2	4
Total	45	38	47	43	48	53	50	57	55	55

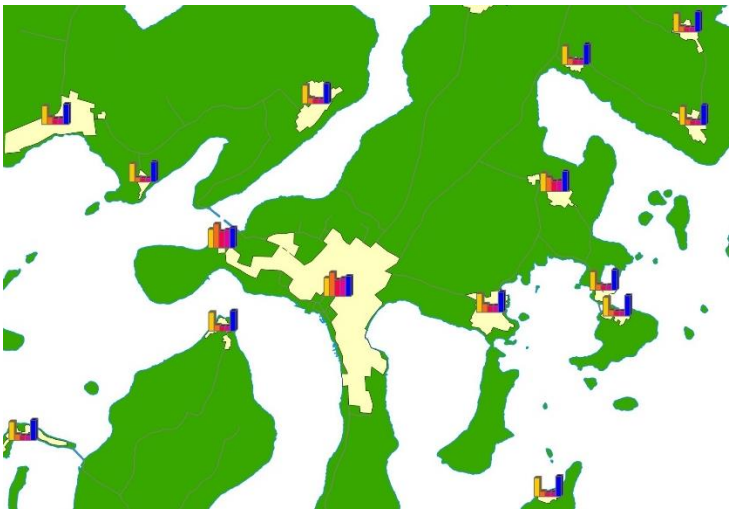

Figure 5.3. An example of output from the study of energy production methods for small communities in Tonga. The green shaded area is land and is surrounded by water (white). The relative sizes of communities (beige) and the prevalence of solar panels (yellow) wind of different strengths (orange, red and purple) and diesel generation (blue bar). From Jackobson and Brunton (2009).

Pilot study

After lengthy discussions between EcoCARE personnel, representatives of the organisation 'Engineering without Borders New Zealand (EWBNZ)' at the Universities of Canterbury and Auckland, Professor Pat Bodger (Department of Computer and Electrical Engineering, University of Canterbury), representatives of schools in Tonga, the Ministry of Education, Women's Affairs and Culture (MEWAC) and the Ministers of Education, Energy and the Environment in Tonga, it was collectively decided to participate in a series of projects to establish renewable energy systems into all 36 high schools in Tonga. An initial pilot study to install two small generation systems into two high schools that were contrasting in their location and system design. The pilot study was sponsored by the Institute of Engineering and

Technology New Zealand, the University of Canterbury Students' Association and the University of Canterbury College of Engineering (ECDPM 2013). In Tonga the team received support from the MEWAC, Tonga Energy Road Map Implementation Unit (TERM IU) and the Ministry of Energy and Lands; the team was hosted in the Vava'u group by Vava'u High School. Funding was provided by the Ministry of Foreign Affairs and Trade in New Zealand and its High Commission in Tonga.

In November 2008 Professor Pat Bodger (College of Engineering, University of Canterbury) and five students travelled to Tonga to begin a scoping exercise that included an energy audit. The purpose of the scoping exercise was to determine the best renewable energy options for Tonga College on the main island of Tongatapu and Vava'u High School on the main island in the Vava'u Group some 360 kilometres north. At each school the students collected solar and wind data and considered how practical it would be to install wind power or solar photo-voltaic panels. They also evaluated the existing local grid and diesel generation systems, and identified the locally available skills that might be used to participate in maintaining the installed systems. The students carried out an energy audit of Vava'u High School, and the electricity utility company Tonga Power Limited was visited to gain an understanding of local infrastructure.

Figure 5.4 Professor Pat Bodger and postgraduate engineering students taking wind measurements on Vava'u

A report was prepared and presented by EWB. Lengthy discussions in regard to the most appropriate power generation technology included: the information obtained by the students from their scoping exercise, Tonga's geography, climate, available natural resources, available local capabilities related to these technologies, expected life of the technologies and so on. It was

decided that solar PV panels, which convert sunlight to electricity, proved to be the best option for the remote Pacific Island situation as they are relatively robust (these systems have survived numerous cyclones and annual monsoon rain since their installation) and the panels themselves require minimal maintenance.

Installation of solar PV panels at Vava'u High School and Tonga College

Before leaving for Tonga, University of Auckland and University of Canterbury students involved in the project were required to find funding, make system designs, determine logistics for procurement and transportation of materials and organise their own travel and accommodation in Tonga. In Tonga they had to install the equipment, produce reports, and prepare and present talks to Vava'u High School and Tonga College and to the Tongan Ministry of Education, Women's Affairs and Culture (MEWAC). The students obtained necessary hardware and negotiated the elimination of import duties and consumption tax through letters of request to the Tongan Customs Department. The development of system designs by students was supervised by Professor Pat Bodger and Mr. Jim Palmer (a registered electrical inspector in New Zealand). All systems conformed to both New Zealand and Tongan electrical standards. Funding for the project was obtained from numerous sources including the New Zealand Ministry of Foreign Affairs and Trade (NZMFAT), the NZMFAT High Commission in Tonga, Engineering Without Borders, Air New Zealand and Virgin Pacific Airlines (reduced freight costs), MEWAC in Tonga and Vava'u High School (supplied on campus visitors accommodation).

With the support of the Minister of Education, the staff of MEWAC and the principals and teachers of Vava'u High School and Tonga College, the installations were completed in the

allocated time (May 2012 until December 2012) and under budget. At the time of installation both systems worked as well as expected. The students performed the tasks required of them to the highest level and were able to use the opportunity they were given to gain academic credit. The funders were not disappointed by the outcomes and the collaboration between funders, voluntary organisations, tertiary institutions, private industry, state-owned enterprises, NGOs, government departments and NZMFAT was highly successful. The schools benefitted substantially from the installations and were in most cases able to use the solar generated electricity to increase ICT usage.

Solar PV panels, which convert sunlight to electricity, proved to be a successful means of electricity supply for use at the two Tongan high schools. They have been found to be robust (they have survived numerous cyclones and annual monsoon rains since their installation) and both the panels themselves and the grid-tied system require minimal maintenance. In a grid-tied system the panels generate electricity that is fed directly into the local Tonga Power Limited-maintained grid through direct current to alternative current inverters that were installed along with the panels and power that is generated can be subtracted from the power that is used by TPL. In the off-grid system the electricity that the panels produce is supplied to a battery storage bank from which electricity can then be drawn upon by facilities (in the case of Tonga College this was a water pump). However, batteries require constant maintenance and while the grid-tied system is still functioning well, the off-grid system at Tonga College has had a number of batteries replaced and is no longer in use. The Engineers Without Borders chapter of the University of Auckland has plans to convert this off-grid system to a grid-tied system as installed at Vava'u High School.

Both projects were completed under-budget and under time. At the time of installation both systems worked as well as we had expected. The students performed the tasks required of them to the highest level and were able to use this opportunity to gain academic credit. The funders were not disappointed by the outcomes and our collaboration between funders, voluntary organisations, tertiary institutions, private industry, state-owned enterprises, NGOs, government departments and NZMFAT was deemed a great success.

Wireless Communication and renewable energy project

The successful installation of solar PVs into Tonga College and Vava'u High School was the first stage of a programme to introduce renewable energy and audio-video communications systems into schools and hospitals in Tonga. Because many schools and hospitals are far removed from goods and services that may be required for the maintenance and repair of equipment, it was essential that technologies used were virtually maintenance free and robust, and/or that capabilities required for ongoing sustainability of the equipment were either present in the local communities or the appropriate capabilities could be developed.

Figure 5.5 A University of Canterbury Wireless Research Centre researcher measuring data upload and download capability at a school in Tonga

The Vava'u High School and Tonga College project had shown that Solar PVs in a grid-tied configuration provided a sustainable source of electricity and that suitable post-graduate students supervised by academics and qualified trades-people from both New Zealand and Tonga

could design, procure and implement appropriate technologies for remote island communities. Lessons learned from the installations of solar PVs at these two schools enabled EcoCARE to design a more ambitious programme that included not only the introduction and utilisation of renewable energies to increase ICT usage but the use of ICTs as a means to connect schools using wireless line of sight technologies instead of the inefficient satellite-based communication system that even today the vast majority of people use.

The Programme

In collaboration with the Ministry of Education, Ministry of Energy, the Ministry of Information and Communications Technologies, Tonga Energy Road Map Implementation Unit (TERM IU), school representatives and the Prime Minister's Office in Tonga, Professor Pat Bodger (University of Canterbury), James Palmer (electrical inspector) and a number of others who had been involved in the previous project, a proposal was made to install 8kW/h of solar PV-generated electricity into all 36 high schools in Tonga. Rotary New Zealand World Community Service (RNZWCS) offered to act as the fund conduit and funding was obtained from the New Zealand Ministry of Foreign Affairs and Trade (NZMFAT) Sustainable Development Fund (SDF). Initially, it was proposed that five schools would receive solar panels with the other schools receiving there's in subsequent years. Unfortunately, a change in government policy has meant that only five schools have benefitted from the programme.

Post-graduate engineering students were involved in performing project management reports and in doing feasibility studies for which they received academic credit, while students from other disciplines (Education, Commerce and European Studies) investigated the impacts of the new technologies on local communities, and local economies. Talks were also held with

members of the Wireless Research Centre (WRC) at the University of Canterbury who suggested that line-of-sight wireless technologies might be utilised to address communication needs. Subsequently, three experts from the WRC travelled to Tonga to carry out a feasibility study to link the five schools initially chosen to receive solar panels. They were well supported by the Ministry of Education in Tonga, Tonga Power Limited (TPL), Tonga Communications Corporation (TCC), The Ministry of Information and Communications Technologies and the schools that were to receive the panels. In regard to the renewable energy portion of this programme Memoranda of Understanding (MOUs) were struck between EcoCARE Pacific, the Tongan Ministry of Education, and Tonga Power Limited regarding each organisation's obligations to the project.

Small teams of students from the University of Canterbury with appropriate expertise were chosen and mentored in specific preparatory tasks as follows:

- System design
- Procurement of necessary hardware and other materials
- Travel and accommodation of team members both internationally and within Tonga
- Project implementation planning
- Formalising agreements with in-country partners
- Arranging work schedules
- Checking Tongan electrical, civil and mechanical regulations so that implementations applied to and met Tongan standards

The postgraduate students with the assistance of Ministry of Education, school students and staff, TERM IU, Tonga Power Limited staff, 12 local interns and a local contractor were involved with the design of electrical systems, sourcing and procuring of hardware, travel arrangements, logistics of getting goods from their countries of origin to Tonga and through customs,

transportation to each site, installations, connection and commissioning of the five solar photo-voltaic systems. The project took 2-weeks in June-July 2012 to complete at which time a final report was submitted on behalf of EcoCARE Pacific Trust to Rotary New Zealand World Community Service (RNZWS). RNZWS then submitted its final report to NZMFAT and it was accepted. The final Certificate of Completion of Electrical Works was received from the Electricity Commissioner in Tonga (Lord Dalgety) at the beginning of September 2012 and the project was signed off by Rotary International and the New Zealand Ministry of Foreign Affairs by 31 December 2012. Although over NZ$300,000 was received to complete this project a surplus of NZ$175,000, was returned to NZMFAT. A number of articles have written about the project and are listed in Table 5.3.

Unfortunately, the New Zealand Ministry of Foreign Affairs and Trade Sustainable Development Fund was discontinued after the completion of the five schools project so it has not been possible to install solar panels into the other high schools at this time.

Evaluation of renewable energy and communication projects

The exploratory approach used in the above projects, combined with regular consultations with partner individuals, institutions, organisations, government and community representatives led to the identification of conditions that needed to be fulfilled if renewable energy and ICT connectivity were to be sustainable on remote island communities.

Firstly, the grid-tied solar photo-voltaic panels installed in Tonga for electricity production fulfilled the requirement that they be robust and have long working lives. They should function successfully for 25 years or more with very little maintenance, but ideally the

requirement for ongoing battery maintenance and replacement in off-grid systems needs to be re-considered as an option. Further work is required to address this issue and it is possible that Tesla type battery technologies offer realistic opportunities for relatively maintenance-free off-grid systems.

Secondly, line-of-sight, high data transfer, audio-video, wireless technologies offer a potentially, effective solution to the specific communication requirements in Tonga with its remote island configuration. The utilisation of existing wireless technologies that are established within most communities in Tonga offers the opportunity for the strategic placement of towers on a centrally located island and the use of microwave technologies to facilitate the linking of existing telecommunications infrastructure.

Thirdly, it is clear that local capabilities must be built into new technology-based projects so they can be deployed successfully in both the short and long term. The introduction of these technologies into schools also enables them to be used as educational tools in a variety of classes, including chemistry, physics, mathematics, geography and economics, and in electrical and mechanical workshops. By doing so students can learn how to maintain and sustain the new technologies and they gain a better understanding of how best to use them and knowledge gained by using them in their communities and later lives.

In addition to their primary functions of providing electricity and an effective communication system the newly installed technologies provide opportunities for new educational initiatives in primary schools and high schools. Most obviously, students and teachers can become familiar with computers, intra-net systems and software packages. Having a broadband internet connection to Tongatapu will provide schools with access to the World Wide Web. By using a server-based system similar to those used by many institutions and large

organisations, information can be uploaded and downloaded via the broadband cable and made available to users connected to the national intra-net. The new technologies therefore reduce the effective isolation of Tonga schools and allow access to educational packages and on-line information that can enrich the school curriculum in many subjects. Extremely large amounts of data can be transferred relatively cheaply on an intranet system meaning that multiple users at multiple locations (30 or 40) can be involved in full audio-visual communications allowing for the establishment of virtual class rooms, healthcare workshops and so on (Woodward 2011). If such systems were to be installed in a similar way to that used to install the solar photo-voltaic systems into the five high schools, i.e., using postgraduate students, local interns and local contractors, a large degree of sustainability can be built into the education system.

c. Health- related projects

Safe drinking water

Basic needs, including the provision of food, shelter, clothing and water are met in most Tongan communities; however, access to safe drinking water is an issue in some of them. Thus, local people and medical practitioners have noted numerous instances of typhoid contaminated ground water especially in communities residing in low lying areas where groundwater from the freshwater lens beneath the ground is

Figure 5.6 New Zealand High Commissioner to Tonga and EcoCARE representatives open a newly established safe water station at a high school in Tonga

the main source of drinking water. The health issue appeared to be most acute on islands of the Ha'apai group which are surrounded by very shallow water that makes it almost impossible to establish sewage systems from which treated effluent can be piped to deeper water offshore. Local communities in the Ha'apai Group therefore rely on buried septic tanks or holes dug into the ground. Normally, the septic tanks need to be emptied every 2-3 years and the waste can either processed and piped to deeper water, or pumped into a pit on higher ground. However, the collection and disposal of raw effluent is not always possible in poor, remote communities, resulting in waste tanks remaining full for long periods. Consequently, sea water can encroach on the freshwater lens during storms causing water to flow into the in-ground tanks and effluent to flow out into the ground water, resulting in outbreaks of typhoid and other diseases.

In 2006 with the cooperation of local people and the Ministry of Health and grants from two Christchurch organisations (the Christchurch Canterbury Club and the Papanui Rotary Club), EcoCARE personnel were able to design and install a water filtration system and reverse osmosis desalination plant in the hospital in Pangai, the main town in the Ha'apai Group. Before the installation of this safe water system, the hospital, like the rest of its remote community had no access to safe water, which had to be boiled prior to drinking. The safe water system included an electric-powered pump and a 240/12 volt inverter[87]. More recently, EcoCARE has been involved in the installation of safe water systems in seven high schools and another three are expected to be installed in 2018. These safe water systems have been of great benefit to local communities in the Ha'apai Group, particularly after

Figure 5.7 Safe water station consisting of a pump, coarse and fine filters, UV-irradiator, 240/12V inverter and 12V cable attachment points.

[87] The inverter enables the system to run from the 240 volt mains power supply or in the case of power outages from a 12 volt car battery. The system includes low tension leads to attach to a car battery.

tropical cyclone Ian devastated its islands in January 2014 and all public services infra-structure became unusable (pers. obs.).

Like other technologies with which EcoCARE has been involved in Tonga the safe water stations can also function as educational tools. The placement of taps on the up-stream and down-stream sides of the filter system enables students to measure flow rates and take samples of water that can be used to carry out tests on water quality. For example, simple tests of bacterial contamination can be made allowing students to determine the effectiveness of the system and determine when it is time to clean or exchange filters[88].

Mosquitoes as disease vectors

Mosquitoes are vectors of numerous diseases which infect human beings and their incidence is increasing world-wide, due in part to increased airline travel and population mobility. Several mosquito species that are competent vectors of disease are present on Pacific islands (Roth et al. 2012) and outbreaks of dengue fever, chikungunya virus and Zika virus have all occurred in Tonga between 2014 and 2016 (Tonga Ministry of Health 2015, 2016). Control of mosquito-borne diseases is not easy, and generally involves trying to eradicate or at least reduce populations of vector mosquitoes. The most straightforward way to do this is by targeting the larval stages which often inhabit small bodies of still or stagnant freshwater including discarded containers. In 2006 when EcoCARE initiated a mosquito project no information was available on

Figure 5.8 Professor Jon Harding, Dr Sharyn Goldstien, Dr Stephanie Jones and Dr Culum Brown sampling mosquito larvae from a rubbish tip in Tonga

[88] The exchange and purchase of new filters for the safe water stations is the responsibility of each school's Parents and Teachers Association, which acts as an interface between the school's needs and the local community.

the distribution of disease-carrying mosquito larvae in Tonga (Harding et al. 2006, 2007), a prerequisite for attempting their control.

In conjunction with Professor Jon Harding and Dr Culum Brown a lecturer and researcher from the University of Canterbury a proposal was drawn up to investigate the distribution of invasive mosquitoes in Tonga. The project was subsequently funded by the Critical Ecosystem Partnership Fund (CEPF)[89], an NGO-only fund based in the USA whose fund disbursement for Oceania is managed by Pacific Invasives Initiative (PII) at the University of Auckland. Because the project was designed to conform with the philosophical approach of EcoCARE its purpose and methodology were introduced to as many local communities and government officials as possible and their permission was obtained to carry out sampling of freshwater habitats. During the actual research phase, local schools and communities were encouraged to participate and at the end of the project, information obtained by the researchers was extensively disseminated, not only to government representatives, but throughout the wider communities, including those on outer islands. A second study supported by the University of Canterbury in 2012-13 enabled the research on larval mosquito habitats to be extended and for an identification key to larvae of all species known from Tonga to be constructed for use by health authorities and researchers (Swan and Galatowitsch 2017).

Figure 5.9 Russell Taylor talking to a Year 13 class at Vava'u High School

The project established that 14 species of mosquito have been recorded in Tonga. Nine of them are introduced species, all of which are known to bite humans. Of particular note is the finding in 2012-13 of *Aedes albopictus*, an

[89] CEPF is a joint program of l'agence française de développement, Conservation International, the European Union, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank

aggressive day-biting mosquito that is a known vector of dengue fever, chikungunya virus and Zika virus, and has also been infected with Japanese encephalitis, Western Nile Virus and Eastern Equine Virus in the laboratory. Its larvae were found most abundantly in artificial container habitats such as old washing machines, tyres and cans where water had been allowed to accumulate. To reduce the risk of infection by this and several other species, elimination of potential larval habitats provided by containers, especially within and close to human communities, is an obvious action that can be taken and addressed through education.

EcoCARE has addressed issues related to the dissemination of the mosquito research findings by creating multilingual posters and brochures that both summarise the results and provide information on how to reduce the risk of being bitten and contracting disease. Public talks and talks at all high schools in Tonga have also helped to address these issues and following an appeal to the Minister of Education the subject of invasive mosquitoes and mosquito-borne diseases such as Dengue fever have been included in the national science curriculum. To date there is no evidence to suggest that these initiatives have had a positive impact on the incidence of Dengue fever in Tonga but many students and other Tongans can be expected to be better informed about mosquito-borne diseases and their control as a result of these education-based programmes.

Summary of EcoCARE activities in Tonga

As a New Zealand registered charitable trust and NGO (Non-Governmental Organisation) EcoCARE Pacific has the opportunity to access funds that are not available to universities and governmental organisations. By doing so EcoCARE has been able to disburse funds to individuals at the University of Canterbury and other institutions so that researchers and students

could participate in projects that have addressed specific educational, technological and health issues in Tonga.

More specifically, projects instigated by EcoCARE have been able to introduce renewable energy into remote communities, and so given them access to lighting and refrigeration and enhanced access to information and communication technology. Health issues, including the provision of clean drinking water and control of disease-carrying mosquitoes have begun to be addressed and a range of other education-related initiatives have been implemented. By involving members of local communities and schools, local interns, contractors, and other Tongan nationals alongside academics and students from New Zealand universities (a number of whom were Tongan), valuable information has accrued to them in addition to the Tongan communities and has resulted in at least 30 peer-reviewed journal articles, reports and theses being produced from aid and development programmes supported by EcoCARE Pacific Trust (Table 5.2).

A particular strength of the EcoCARE approach, is that it enables individuals from multiple areas of expertise and differing organisations to be involved in development-related programmes. Academics, postdoctoral researchers, doctoral and masters students, trades people, volunteers with specific skill sets, contractors and so on, are all able to participate in these programmes. Through their contributions development projects have been suggested, designed and undertaken in collaboration with members of Tongan communities. The projects have been primarily for the benefit of the people of Tonga and have also increased the capabilities of individuals in local communities over time. Thus, EcoCARE programmes consider every situation and activity as an opportunity to build capacity and sustainability in the local

population. Furthermore, if local student projects can be built into programmes, the likelihood of long-term sustainability of development projects is enhanced.

The philosophical basis of EcoCARE's development activities is provided by Enpovigo, which as described in Chapter 4, has similarities to other well-meaning ideals that people have formulated over time. However, it differs from many other approaches in that it requires an often complex, first-hand process of observation and consultation with appropriate local communities, organisations and individuals who are expected to benefit from the implementation of projects, and also with a diverse range of personnel from partners and fund providers. Enpovigo is not based on any one, two or three differing theories but rather it is plastic in nature so that it can include aspects of a multitude of relevant ideas that, in combination fit appropriately within the context of each unique situation. Access to and the utilisation of information is a fundamental aspect of Enpovigo and significant emphasis is placed on the acquisition of and dissemination of information obtained through the projects and through the installation of communication technology throughout the country.

Tonga has provided an opportunity to trial different methods of enabling the expression of the Enpovigo development philosophy and to build upon it in a sustainable way. It has offered the opportunity to generate ideas, build models, review them and re-model until workable and sustainable solutions have been found. Each programme has played a significant role in facilitating the overall ability of communities to realise the desired outcomes of Enpovigo; 'that sustainable self-determination of individuals, communities and nations are better able to choose their own paths through the empowerment that knowledge presents and, that they will be 'happier' (in both the utilitarian and cognitive senses of the word) than they were prior to the commencement of development activities'.

Table 5.3 List of journal articles and theses related to individual and institutional involvement in projects associated with EcoCARE Pacific Trust in or about Tonga.

Authors	Title	Citation
Energy/Technologies		
William Jacobson and Richard Brunton	Feasibility of utilising alternative energy for small island communities in Tonga	(Jacobson and Brunton 2009)
Stewart Hardie, Luke Sinclair, Sam Davies, Dane Hart and Robert Cardwell	Implementing a solar power system for a high school in Tonga	(Hardie et al. 2010)
Graeme Woodward	Field trip to Tonga to assess feasibility of low-cost schools wireless intranet	(Woodward 2011)
Parash Acharya	Small scale maximum power point tracking power converter for developing country application	(Acharya 2013)
Xueshu Cao	The design of a highly penetrated hybrid renewable energy system for the Ha'apai Group	(Cao 2015)
Kirsten Erikson	The European Union, a future funding provider? An impact assessment of solar panel installation on ICT usage in Tongan schools.	(Erikson 2015)
Shreejan Pandey, Pat Bodger, Vladimir Abelentsev and Andrew Lapthorn	Tongan schools go solar; 8 kW photovoltaic system design & installation by University of Canterbury students in five Tongan	(Pandey et al. 2013a)

	schools	
Shreejan Pandey, Pat Bodger and Andrew Lapthorn	Renewable energy in the Kingdom of Tonga; national plan & PV generation systems	(Pandey et al. 2013b)
Shreejan Pandey, Kate Mang, Pat Bodger and Andrew Lapthorn	Tongan schools go solar: Is it possible to deliver development projects with cost-effective partnerships?	(Pandey et al. 2013c)
Mubin Abd Rahman	Power system for Tonga: developing demand and consumption forecasting tool	(Rahman 2013)
Tim Roper	NZ and the EU in the Pacific: renewable energy as a mechanism for development	(Roper 2013)
Environment and health		
Jon S. Harding, Culum Brown, Felicity Jones and Russell Taylor	A preliminary assessment of the distribution of mosquitoes in the kingdom of Tonga: potential threats to biodiversity through invasive pathogens	(Harding et al. 2006)
Jon S Harding, Culum Brown, Felicity Jones and Russell Taylor	Distribution and habitats of mosquito larvae in the Kingdom of Tonga	(Harding et al. 2007)
Karyna Rosario, Anisha Dayaram, Milen Marinov, Jessica Ware, Simona Kraberger, Daisy Stainton, Mya Breitbart and	Diverse circular single-stranded DNA viruses discovered in dragonflies (Odonata: Epiprocta)	(Rosario et al. 2012)

Arvind Varsani		
Daisy Stainton, Simona Kraberger, Matthew Walters, Elizabeth J Wiltshire, Karyna Rosario, Samiuela Lolohea, Ika Katoa, H Faitua Tu'amelie, Waikato Aholelei, Luseane Taufa, John E Thomas, David A Collings, Darren P Martin and Arvind Varsani	Evidence of inter-component recombination, intra-component recombination and re-assortment in Banana bunchy top virus	(Stainton et al. 2012)
S. G. Kumari, A. Najar, S. Timoumi, M. F. Male, S. Kraberger and A. Varsani	First report of Chickpea chlorotic dwarf virus naturally infecting chickpea in Tunisia	(Kumari et al. 2015)
Maketalena F. Male, Viliami Kami, Simona Kraberger and Arvind Varsani	Genome sequences of Poaceae-associated Gemycircularviruses from the Pacific Ocean island of Tonga	(Male et al. 2015)
Milen Marinov, Mark Schmaedick, Dan Polhemus, Rebecca L. Stirnemann, Fialelei Enoka, Pulemagafa Siaifoi Fa'aumu and Moeumu Uili	Faunistic and taxonomic investigations on the Odonata fauna of the Samoan archipelago with particular focus on taxonomic ambiguities in the “Ischnurine complex”	(Marinov et al. 2015)
Daisy Stainton, Mana’ia Halafihi, David A. Collings and Arvind Varsani	Genome sequence of Banana streak MY virus from the Pacific Ocean Island of Tonga	(Stainton et al. 2015)
Thomas Swan	Distribution, occurrence, and identification	(Swan 2015)

	of mosquito species in the Tongatapu Island Group, Kingdom of Tonga	
Ashley J. Williams, Stephen J. Newman, Corey B. Wakefield, Melanie Bunel, Tuikolongahau Halafihi, Jeremie Kaltavara, and Simon J. Nicol	Evaluating the performance of otolith morphometrics in deriving age compositions and mortality rates for assessment of data-poor tropical fisheries	(Williams et al. 2015)
Tuikolongahau Halafihi	Ecology and biology of *Etelis coruscans* and *Pristipomoides filamentosus*: case study of the Tonga deep-water bottomfish Fishery	(Halafihi 2016)
Nicholas Hill, Tuikolongahau Halafihi, Ashley Williams and Tom Peatman, Simon Nicol and Neville Smith	Application of a harvest strategy to resource-limited deepwater snapper fisheries	(Hill et al. 2016a)
Nicholas J. Hill, Ashley J. Williams, Tom Peatman, Simon J. Nicol and Tuikolongahau Halafihi	Development of a harvest strategy for resource-limited deepwater snapper fisheries	(Hill et al. 2016b)
Maketalena F Male, Simona Kraberger, Daisy Stainton, Viliami Kami and Arvind Varsani	Cycloviruses, gemycircularviruses and other novel replication-associated protein encoding circular viruses in Pacific flying fox (*Pteropus tonganus*) faeces	(Male et al. 2016)
Hannah Charan-Dixon, Sally Gaw, Sharyn Goldstien and Chris N. Glover	Effects of waterborne cadmium on energy metabolism in the tropical sea cucumber, *Stichopus horrens*, and a comparison of tissue-specific cadmium accumulation with	(Charan-Dixon et al. 2017)

	the temperate sea cucumber *Australostichopus mollis*	
Thomas Swan and M.L. Galatowitsch	Identification key to the mosquito (Diptera: Culicidae) larvae of the Tongatapu Island group, Kingdom of Tonga	(Swan and Galatowitsch 2017)
Arvind Varsani, Greg Frankfurter, Daisy Stainton, Maketalena F. Male, Simona Kraberger and Jennifer M. Burns	Identification of a polyomavirus in Weddell seal (*Leptonychotes weddellii*) from the Ross Sea (Antarctica)	(Varsani et al. 2017)
Corey B. Wakefield, Joseph M. O'Malley, Ashley J. Williams, Brett M. Taylor, Ryan S. Nichols, Tuikolongahau Halafihi, Robert L. Humphreys Jr., Jeremie Kaltavara, Simon J. Nicol and Stephen J. Newman	Ageing bias and precision for deep-water snappers: evaluating nascent otolith preparation methods using novel multivariate comparisons among readers and growth parameter estimates	(Wakefield et al. 2017)
Other		
Blair Marett	A policy paper prepared for EcoCARE Pacific Trust: an overview and evaluation of potential funding providers	(Marett 2014)

Chapter 6 Concluding discussion

Following the end of World War 2 European countries began rebuilding their economies. There was a general belief in the West and in particular the USA that the success of a nation lay in its economy and that development could be attained only by growth measured in terms of GDP or other economic measures. Subsequently, the idea that cultural, social and institutional factors were also important for successful development was voiced, although not at the expense of economic growth. A feature of Modernization theory was that development of underdeveloped countries should follow the path of western nations and in doing so, other factors including highly significant differences in culture were frequently ignored. In fact, in some cases it was suggested that successful development relied upon a nation's willingness to reject tradition. It became apparent that modernist models had only limited success in delivering benefits to poorer nations. In contrast to Modernization theory, Neo-liberal economic theory, which emerged in the 1970s and 80s was driven by market economics and embraced globalization encouraged by developments in communication technology.

Although it had been proposed that market-driven models would offer global solutions in the war against poverty, a large number of projects that applied the neo-liberal philosophy to development did not address the plight of the poor directly, and not infrequently resulted in the rich getting richer and the poor, poorer. The basic needs approach was one of the early and significant attempts to evaluate development outcomes by means other than by economic indicators and was a forerunner to the post-development and post-modernization approaches of the next decades. These and allied movements signalled a move away from a predominantly

economic approach to development by placing greater emphasis on participation by local individuals in under-developed nations, by developing local capabilities and capacity in the interests of sustainability, and by acknowledging the relevance for development of local customs and cultures. The philosophy of Enpovigo, which underpins the activities of EcoCARE Pacific is closely aligned with this sustainability and human-oriented focus of development by having a participatory approach, and by emphasising the development of local capabilities has successfully undertaken projects to the benefit of small, often geographically remote communities.

Substantial funding for international development has come from the World Bank Group, the European Union and the United Nations and more recently from multinational and transnational corporations. Vast numbers of non-profit organisations (NGOs) are also involved in international development activities but more often than not on a smaller, often 'boutique' scale. The European Development Fund originating with the Treaty of Rome in 1957, provides significant financing for economic and social progress in African, Caribbean and Pacific countries and subsequent congresses laid down modified guidelines as to how international development should best proceed. For example, the Yaounde conferences of 1964-75 emphasised trade and saw developed and undeveloped countries as 'partners', while the Lomé conferences placed greater emphasis on self-reliance, self-sufficiency, food security and human rights. The desirability of having reciprocal trade agreements rather than those favouring the European Union were a part of the Cotonou conference, and preceded the proclamation of the European Consensus of 2005 that advocated a strongly co-ordinated EU approach to development with strong partnerships between stakeholders and partner countries.

The Bretton Woods Conference in 1944 near the end of World War 2 saw the establishment of the World Bank Group as a vehicle of the United Nations for funding economic development and the elimination of poverty. Its funds are derived largely from wealthy member countries. The International Finance Corporation, another member of the World Bank Group, also works to create new opportunities for people in developing countries. It encourages private sector development in developing countries and is the largest global institution to do so. The 2000 Millennium Development Goals provided a notable milestone in stating how the needs of developing countries were perceived by the UN, however, in practice, achievement of these goals has been highly variable as discussed in Chapter 3. It is also difficult to be optimistic about the likely success of their successors, the Sustainable Development Goals, as many seem to be overly idealistic and in the words of Vandemoortele (2015) "…include targets that are mostly unclear, unfocussed and unmeasurable". Furthermore they continue to rely on continuing production and consumption of the Earth's ever-dwindling and finite resources.

Enpovigo and EcoCARE Pacific

The philosophy of Enpovigo was devised from a collection of aspects of numerous other theories and approaches to development and it mirrors that of Sachs, one of the instigators of the Sustainable Development Goals, in its promotion of social inclusiveness and environmental sustainability. As we have seen, projects undertaken by EcoCARE Pacific also encourage local participation and capability building and as an NGO it is in a position to access funds and expertise from a variety of sources and personnel whose philosophies are in agreement with its own. In contrast to some earlier development models, notably those that were intent on

imposing a westernised culture on developing nations, EcoCARE is strongly of the opinion that one development model does not fit all, and that theories and approaches need to be adjusted, hybridized and applied to specific situations. Thus, although the conceptual framework behind the Enpovigo Development Strategy has been generated in the context of Tonga, and may well be applicable in comparable situations, modifications in approach might be expected elsewhere, where attitudes and differences in cultural and environmental factors can be expected.

A fundamental belief of the stakeholders of EcoCARE Pacific is that knowledge increases the capacity and capabilities of individuals, communities, nations or regions and that knowledge enables informed choices to be made so that appropriate development projects and programmes that result in desired outcomes are implemented and are sustainable. To this end EcoCARE contends that access to information through renewable energy-facilitated ICT usage will provide access to that knowledge and thereby provide the opportunity to increase capacity and capabilities for the benefit of targeted communities. A further consequence of an increase in local knowledge should be an increase in the sustainable self-determination of individuals and communities, i.e., in their ability to make sustainable, self-motivated, informed choices in relation to their lives without external influence or interference (Deci and Ryan 2002). Sustainable self-determination also infers less reliance on remittances, loans, grants and other forms of foreign aid to support their economies and therefore greater independence. By gaining access to information, people in Tonga will have more opportunity to obtain expertise and qualifications in relevant employment areas such as renewable energy, fisheries, agriculture and manufacturing. Entrepreneurs will be able to market products, and the ability to negotiate contracts and organise transportation of products to foreign markets will be enhanced. Furthermore, developments in the energy sector should mean that in addition to benefitting from

sustainable energy production and having access to ICTs, Tongans will be able to gain qualifications in system installation, design, maintenance, power production, distribution and metering, software maintenance and installation.

The Enpovigo Development Strategy outlined in Chapter 4 suggests that as capacity increases, benefits should be seen in areas such as health and education as well as in the economy. I acknowledge that the idea that more informed societies are likely to become more successful societies is not new. For example, 16 years ago Ekdahl and Trojer (2002) noted that "information and communications technologies (ICT) have become a mantra for economic development – at the global as well as the local levels", and suggested they had the potential to provide solutions to a range of economic and social problems.

Using the kingdom of Tonga as a case study, I have illustrated how holistic, collaborative, participatory and innovative approaches can be achieved within the context of Enpovigo, with reference to educational and health issues as well as the establishment and use of renewable energies and information and communications technologies. Although economic outcomes are typically seen as the most important criteria by which development activities are judged, I have proposed that their most important (but not only) outcome should be the happiness of target populations or communities. As we have seen, happiness is a difficult concept to define, but Easterlin's (2016) definition of happiness being synonymous with subjective well-being reflecting "dimensions of well-being such as health, work, and family and social relations" is an appealing one to me within the context of Enpovigo. The culmination of development for a nation might therefore be the point when a nation no longer requires aid, remittances, loans or other forms of financial support to maintain its economy and when members of its population are predominantly happy with the lives they lead.

The development-related activities of EcoCARE Pacific are designed to participate in the achievement of a combination of economic and social outcomes and in doing so enhance the happiness of Tongan communities. The activities of EcoCARE Pacific Trust emphasise collaboration with, and participation by, local people and acknowledge that relevant capabilities are necessary if sustainable development is to be successful. In line with this philosophy and the contention that information builds knowledge, renewable-energy-powered ICTs are being established to serve remote Tongan communities and so provide access to information. EcoCARE's involvement in the establishment of scholarship programs, a national high school science competition, and the provision and distribution of health and educational resources are further examples of how local capabilities are being fostered in a sustainable way.

Of the main 'actors' and financiers of development on the world stage few appear to have such an innovative capabilities-based approach to development with happiness as a target outcome. An exception is The Norwegian Agency for Development Cooperation (Norad), a directorate under the Norwegian Ministry of Foreign Affairs whose task is to ensure that foreign aid is effective (http://norad.no). In contrast, many large international organisations, including the United Nations, the European Union, the Bretton Woods Group and BRICS, as well as multinational and transnational corporations seem to have a neoliberal economic outlook and have been unable to produce stable growth and reduce inequality in under-developed countries. Rather than build local capabilities many programmes affiliated with these organisations have also used the funders' own labour for their own benefit, sometimes to the detriment of those nominally funded. In the case of multinational and transnational corporations this is not surprising as they are businesses whose primary objective is to make a profit. In contrast, NGOs may typically be more altruistic by nature and not necessarily motivated by profit. The

following local example is instructive in this regard and illustrates how the life styles and benefits enjoyed by those who live in 'developed' nations rely on 'under-developed' countries for access to cheap labour and raw materials, access to land and water and so on.

In 2014 the New Zealand Ministry of Foreign Affairs and Trade presented a report on the Pacific Tuna fishery (NZMFAT 2012, New Zealand Ministry of Foreign Affairs and Trade 2014), a report which suggested that over the 2011/2012 financial year Pacific Island Countries (PICs) received US$260 million from the fishery, while the industry took US$2.4 billion. New Zealand's Minister of Foreign Affairs and Trade, the Honourable Murray McCully, reiterated this scenario in a statement made in 2014 when he said that "...last year the Pacific tuna fishery yielded between US$4 billion and US$5 billion of fish to international markets, yet less than 10 per cent of that amount made its way back to Pacific countries" (McCully 2014).

The holistic approach and sustainability

In Chapter 1 I presented three interrelated hypotheses that have guided my thought processes during the writing of this thesis and have also influenced, and continue to influence, the development activities of EcoCARE Pacific in Tonga.

1. Holistic programmes can be constructed that enable the development of a multiplicity of skills so that local populations can effectively participate for the national benefit.

2. The goal of sustainable development can be realised on remote islands through voluntary organisations, especially at the community level.

3. Contemporary development theories and funds are frequently ineffective in supporting sustainable development.

With regard to the first of these hypotheses I subscribe to the idea that sustainable development needs to be viewed holistically as a process that is comprehensive and integrated

throughout society. Such a holistic approach is not only possible, but the work of the EcoCARE Pacific Trust indicates that it can succeed in the relatively small island communities that make up the kingdom of Tonga. Thus, diverse array of projects have been implemented in the broad fields of education, technology and health with largely positive outcomes for the benefit of local peoples. EcoCARE places strong emphasis on the need for communication technologies in order to access knowledge and believes it is imperative that local people be involved in the selection and implementation of development activities from their inception.

The idea that local people can solve their own problems is not a new one and there are many examples of how others have attempted to participate in addressing the needs of local communities (Hibbard and Tang 2004, Abadie 2011, Borras et al. 2011, Chaudhry and Ahmed 2014). However, issues surrounding the 'poverty of isolation' have rarely been addressed in a sustainable way. Island populations can present particularly difficult scenarios in this respect and it is hard to perceive a situation in which communities are more isolated than those on oceanic islands surrounded by vast areas of seawater. Such a scenario is the one provided by communities living on islands in the Tongan archipelago and is the situation that has motivated EcoCARE Pacific to come up with innovative approaches to address the needs of Tongan communities and so help enhance the lives, economies and happiness of the people.

My second hypothesis stated that sustainable development can be realised on remote islands through voluntary organisations, especially at the community level. The successful implementation of projects under the guidance of EcoCARE Pacific, a small voluntary organisation, provides support for this hypothesis, although the question of sustainability cannot be answered unequivocally given the relatively short time that EcoCARE has had an active presence in Tonga. As indicated by the Enpovigo Development Strategy there is an inevitable

time-lag between their implementation during the Activation Stage and the building of capabilities as depicted in the Transition and Realisation stages of the strategy. Nevertheless, the emphasis placed on development of relevant capabilities within communities, and on access to expertise and knowledge by way of modern modes of communication, provides the opportunity for locally sustainable technologies.

EcoCARE Pacific Trust has now been actively engaged in aid and development projects in Tonga for the past 14 years during which time its philosophy has remained the same. The projects discussed in Chapter 5 have incorporated innovative approaches to their design and implementation in part to build local and national capabilities and sustainability over time. By employing the information-based feedback loop that is an integral part of the Enpovigo development strategy, ideas, concepts, methodologies and maintenance programmes continue to have the opportunity to evolve and hopefully produce increasingly better outcomes, both at a practical level and in order to enhance levels of happiness and well-being of communities.

Application of the Popperian Enpovigo Information Based Feedback Loop (EIBFL) during all stages of projects results in ongoing adjustments being made to processes and methodologies that allow them to suit particular situations. The implementation of renewable energies in schools has the objective of building sustainability into the process and is one example of how the EIBFL can be successfully applied to achieve positive outcomes in a variety of situations. The employment of research students from the University of Canterbury into projects has enabled a significant research and development (R&D) component to be included in them and has resulted in better solutions being found, particularly with respect to project implementation in isolated communities. Lastly, whether the approach directed by the philosophy of Enpovigo can make a significant impression in larger, under-developed nations

remains to be seen as they present more complex issues, particularly in relation to logistics. For example, to support the computing needs of the high school student body of Tonga would mean sending and distributing approximately eight thousand computers, whereas to support the student body of a large nation like Nigeria might require several million computers. Handling, testing, shipping and distribution of such significant numbers of devices becomes a daunting task. The imminent establishment of a branch of EcoCARE Pacific in Ukraine (EcoCARE Ukraine) and Norway (EcoCARE Norway) may offer the opportunity to test its approach on a larger scale.

The final hypothesis I presented in the Introduction was that contemporary development theories and funds are frequently ineffective in supporting sustainable development. I believe that we in wealthy nations have the capabilities and resources to participate effectively with those living in poorer nations and have much of the knowledge and many of the technologies needed to address global issues, whether human, environmental, or both. However, as I hope I have made clear I believe our focus cannot simply be on economics but rather on survival, justice, honour, sustainability and the attainment of both personal happiness and well-being. Hence, the idea that information can support the building of capacity and capabilities of individuals, communities and nations is the driving force behind Enpovigo, as it enables people to make informed choices and implement appropriate projects that will increase the quality of their lives.

Currently, more money is being made available to undeveloped and developing nations than at any other time in recorded history (Provost 2014). Nevertheless, many projects fail and organisations and institutions that have the capability to support national, regional and global development initiatives are not always able to allocate or disburse a large proportion of the funds available for projects. For example, the European Union admits to problems with its current and

historical development policies (Gavas 2012a, c) and like other 'big players' (e.g., the United Nations, World Bank, International Monetary Fund, Ausaid, USAid) it continues to search for better ways to participate in the positive development of poor nations. One of the experiences I have had with development projects in Tonga, admittedly on a much smaller scale than those funded by the 'big players', is that all of the projects required individually tailored solutions. It seems unlikely that this is a situation unique to Tonga and therefore, to be successful in realising their aims, many projects need to take into account a multitude of factors including geography, culture, language, and resource availability, as well as the availability of capabilities and capacity of the target community or nation. This is not to say that "big push" styled programmes are irrelevant or wrong but rather it needs to be recognised that 'big push' and 'piece meal' styled programmes are relevant in different situations.

A persistent theme running through this thesis is the need for poor and under-developed communities and nations to have access to knowledge so they are then able to build their own capabilities and so begin to control their own destinies. This line of thought is consistent with the comments of Hausmann et al. (2008) in 'The Atlas of Economic Complexity: mapping paths to prosperity' that the wealth of nations is driven by productive knowledge, or capabilities, and measured by looking at that aggregation of productive knowledge and products. Hausmann et al. equated capabilities to building blocks and proposed that a country's ability to realise a diversity of economic outcomes relates to the diversity of that nations capabilities. Thus, development is associated with an increase in diversity that cannot be captured solely by conventional economic measures (Hausmann et al. 2008).

Similarly, my suggestion that the happiness of individuals should be an important outcome of development funding and activities is consistent with this line of thought and has been

discussed at some length earlier in this thesis. However, how to measure happiness remains an issue of considerable conjecture, or to quote The Pursuit of Happiness (2016) "it is at least as difficult as catching rare and elusive butterflies". Reliable studies, surveys and questionnaires are typically randomised and controlled and may require considerable effort and funding, and their reliability also depends on the questions asked. Thus, the questions asked in a happiness survey need to accurately reflect the objectives of the party requiring the survey. This is particularly important if one wishes to know the effect of development activities on the happiness of individuals or a community as the answers will provide valuable feedback, which can be used in the planning and implementation of subsequent development plans. Such feedback is consistent with the feedback loops incorporated in the Enpovigo development strategy, and used to optimise project design and delivery. I therefore agree with Rogers (2011) that it is essential that selected measures of well-being are relevant and well-based in what matters to people both as individuals and communities.

The example of Bhutan, the only country to track Gross National Happiness as one measure of national progress is also instructive (see Chapter 2) as it puts happiness in a context of diverse cultural, economic and environmental factors, including psychological well-being, health, education, living standards, time use (Pappas 2014). In somewhat similar vein I have proposed that a useful, multi-facetted happiness index could be constructed in a comparable way to New Zealand's Macroinvertebrate Community Index (a measure of river health) with questions selected and weighted with respect to the relationships between happiness and development-related (or other) outcomes of specific interest to the developer. Clearly, such multi-facetted questionnaires contrast with the economically focussed approach of major surveys such as the World Happiness Index, because, not only are they used to see whether people are

happy but to provide feedback on the success or otherwise of development programmes and their impact on the well-being and emotional welfare of affected people.

In this thesis I have, in essence, investigated and evaluated sustainable development through the use of information, and capacity and capability building. In particular, I hypothesised that sustainable development can be realised on remote islands through voluntary organisations, especially at the community level. This notion has been tested, and continues to be tested, in relation to the work of EcoCARE Pacific Trust, a small Non-Governmental Organisation with a creative philosophy called Enpovigo in what is essentially a case study in the Kingdom of Tonga, a small Pacific island nation.

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Appendices

Appendix 1 Informal description of my personal motivations to pursue this research

Introduction

I returned to university studies in 1998 after an extended break during which I spent four years working for Greenpeace in Brisbane, Australia, and Greenpeace in Christchurch, New Zealand. From 1994 until early in 1998 I lived and worked in Golden Bay, the most northerly and most isolated community in the South Island of New Zealand. When I returned to my studies in 1998 I chose to take a few undergraduate ecology papers with the intention that I would gain the knowledge and qualifications that I needed to be able to play a more significant role in matters that concerned me. The papers that I chose at the time were entitled Terrestrial Ecology (conservation ecology, forest management, invasive species and so on) and Aquatic Ecology (marine ecology, freshwater ecology and estuarine ecology).

During that year I happened upon some unexpected realisations. Firstly, I came to realise that I needed more than an undergraduate degree to achieve my desired pathway, and significantly, I was introduced to the complexity of ecosystems and the concept of "biological scaling" and followed this interest up by researching biological scaling (Osenberg et al. 1997, Thrush et al. 1997). Biological scaling introduced me to the idea that it may be possible to view projects at extremely small scales and at extremely large scales. I realised that ecologists do view the environment at differing scales (e.g., in $1cm^2$ quadrats, $100cm^2$, $1m^2$, 1 hectare, 100 hectares and so on) and derive different insights by doing so.

This concept of scaling can be applied to most topics and as a former builder I could appreciate that. Thus, if I was working in an estate where 2,000 homes are to be built the main contractor will have an overview of the whole project, whereas the various tradespersons and service providers required to construct the houses, typically view the project only from their specific area of expertise. These sub-contractors may often have a number of teams of people working for them and within each team there will be a site leader. Each of these individual

leaders has differing perspectives and interests but are helping achieve the same large scale project outcome. Often there will be a certain amount of overlap between trades and services but in general sub-contractors will remain focused on their own area of interest. Furthermore, in relation to scaling, a contractor may oversee the construction of one house, 10 houses, large multistorey buildings, or numerous communities. In each instance some participants will only be focused on their particular areas of expertise, but collectively they will be able to construct large communities.

Once I had completed my undergraduate degree I decided to continue my studies and obtain a Master of Science degree in freshwater ecology. My research was designed to introduce me to the concept of biological scaling from an ecological perspective, and resulted in the writing of a thesis entitled "Benthic Ecology of Glacial Rivers in South Westland with particular reference to the Chironomidae" (Taylor 2001). During my MSc research I studied factors that influence macroinvertebrate community structure in streams with differing sources and energy inputs. The outcomes of this research included more than just publication of the thesis. Importantly, I realised that my topic, like most topics I had been exposed to, considered only a very small part of the global environment. It seemed to me that nobody studied our planet from the broad global perspective that I was interested in. At the time I couldn't find anywhere I could go to study global management strategies.

Life Changing Experience

In August 2004 a group of friends and I travelled to the Kingdom of Tonga on a sailing holiday. Although I live in New Zealand (a South Pacific island nation) I was relatively ignorant when it came to knowing very much about my Pacific Island neighbours. After 6 hours of flying from Christchurch we arrived on Tongatapu and stayed the night at the Friendly Islander Motels just outside of Nuku'alofa. The next morning we hired a minicab

to take us to the domestic airport and flew (in a DC3 to Neiafu (the main town in the Vava'u Group of islands) where we were taken to the offices of the Moorings boat charter/hire. After formalising our charter we boarded a 42 foot, Wright designed, sailing catamaran. The crew comprised nine adults and two nine year old boys and the boat catered adequately for all of us. We sailed around the Vava'u Group for 10 days, fishing, diving, visiting uninhabited islands, and so on.

While we were in Vava'u I visited Vava'u High School (a co-educational government school) and Chanel High School (a co-educational Catholic school) where I introduced myself to some teaching staff and students. As I was shown around the schools it became apparent that they had an almost complete lack of educational resources. Science laboratory equipment was almost non-existent, libraries had small numbers of out of date texts, and there were no educational posters or other equipment to be seen. The teachers seemed adequately trained but voiced their frustration at the lack of resources available. Ironically, to the casual observer, the people of Tonga seem to be living the idealised Pacific Island lifestyle. Their houses were clean, lawns were mown, walls and fences were newly painted as were those of schools and hospitals.

The evening before we returned to New Zealand my friends (Drs Janine Bailey and Tim Phillips) and I were introduced to the owner of the Friendly Islander Motels, Papiloa Foliaki-Bloomfield. Papiloa's husband had died in the late 1990s while he was the Director of Health in Tonga and Papiloa had been a nurse. Papiloa remained active in the Tongan community as the first woman, commoner, Member of Parliament and the chairperson of a number of groups including the Tongan Community Development Trust and the Tongan Tourist Bureau. During our discussions Tim happened to mention that he had brought along a considerable amount of medical equipment in case he and Janine needed to perform operations while we were at sea. Papiloa suggested that he donate the medical equipment and supplies to the main hospital in Nuku'alofa.

That evening we travelled with Papiloa to the hospital. As with most of the buildings I had seen in Tonga the exterior was immaculate, newly painted and the grass had been mown[90]. However, inside a different world appeared. In reality, this was a "third world" hospital with

[90] We call it mown grass but in fact in most instances the grass is cut usually by teenage boys with machetes.

dirty, broken windows, ceilings falling down, sink holes holding water and harbouring mosquitoes in the paths, dirt, no air conditioning and so on. We were introduced to the duty doctor who had trained at Auckland University in New Zealand, and who instead of choosing to work in a first world country that would have paid him NZ$150,000/year had returned to his home country and a salary of NZ$35,000/year.

After chatting for a while the duty doctor asked if we would like to make a tour of the hospital before we left. We saw a serious lack of resources, dirty rooms and hall ways and in one ward were introduced to a family of five, two of whom had died from eating fish that they had bought from the local market. The fish had been caught apparently with a toxic substance like Paraquat[91]. The thing that particularly stood out to me was the fact that the fisherman, who was probably local, and possibly related to the people who had died, was unaware of the implications of his actions.

My summation of Tonga's situation as described in Chapter 5, suggested that this small, literate, racially homogenous population, with significant natural and human resources, should be a highly successful and wealthy little nation. Instead it relies on aid and remittances to maintain its economy. I believed at the time of this trip, and I continue to believe, that if we can enable the enormous amounts of expertise and capacity building resources that are available in the universities, polytechnics and other institutions and organisations around the world, then nations like Tonga will be able to apply the principles of Enpovigo and successfully utilise their available resources in ways that benefit the population and their environment.

With regard to my concerns for the current unsustainable path that I see humanity taking, and my desire to participate in the "global management strategies" I mentioned earlier, I felt that Tonga offered me an opportunity. The opportunity would enable me to participate in programmes to trial a different approach to development in which knowledge facilitated through access to information and expertise could have a positive impact on populations of people and how they interact with their environment. It is important to note that I use "knowledge" and "information" in their widest possible senses. In itself, information is not knowledge, but is a tool

[91] Paraquat is the common name for an organic compound N,N′-dimethyl-4,4′-bipyridinium dichloride with the chemical formula $[(C_6H_7N)_2]Cl_2$. It is toxic to humans and other animals.

that can be used to gain knowledge. I suggest that the best way to facilitate information access is through Information Communications Technologies (ICTs).

Can anyone participate in environmental and socio/political issues at a global scale? There is so much going on, so many different environments, cultures, languages, life styles and so on. It is impossible for anyone to know of, and participate in, every project going on in our world and to have an intimate knowledge of the actions of every corporate, government, community group, NGO, civil society and so on. Hence, I completely understand how ridiculous it might seem to many people when I say that I would like to be involved in global management strategies. This same logic probably applies to why there is nowhere to go to study global management strategies. It is also impractical to propose the idea of global management strategies when using conventional thinking about how one might study, assess, evaluate and manage global issues, since the required expertise and knowledge of each of a multitude of topics is only harboured by a few experts in each field.

Institutions and organisations like universities are places of research and development where new knowledge and innovations are born out of good ideas and testing questions. Historically, however there have been significant difficulties in enabling the knowledge that is discovered and realised in places of higher education to be disseminated into the wider community. With many Western institutions and businesses retaining "intellectual property rights" so they are able to obtain financial benefit from the discoveries of their staff or students, new knowledge becomes less likely to be released to the wider community for the benefit of all. Research funding determines what is to be investigated and if the motivation for the research relates to some eventual short-term economic benefit, then the ability of researchers to generate projects that have a long term perspective and no perceivable economic return are less likely to be initiated and realised.

The purpose of my case study was to test the feasibility of participating with a collective of international governments, NGOs, civilian society, tertiary institutions, local contractors, volunteers, professionals with specific knowledge, students, interns, apprentices and private industry to implement of the principles of Enpovigo. This was done by:

- Identifying and addressing issues related to basic needs, i.e., food, water, shelter.

- Developing methods that could enable the knowledge and expertise housed in institutions and organisations to be used for the benefits of developing nations.
- Generating projects and programs that support the sustainable installation of renewable energies into Pacific Island communities that would then support the utilisation of ICTs.
- Designing programs that enable the sustainable implementation of national and international communication systems (audio/video) that support the principles of Enpovigo.

  The work is therefore an expression of Enpovigo (as defined in Chapter 4) initiated and facilitated by EcoCARE Pacific Trust by way of projects and programs that support the development of the people of Tonga.

Formation of EcoCARE Pacific Trust

Janine, Tim and I agreed that something needed to be done but we weren't sure what that should be. We finally agreed that it was important to communicate with the wider community in regards to the dangers of fishing with toxins and the damage that it does not only to the people that eat the fish but to the environment generally. On our return to New Zealand I began investigating the scenario and the possibility of utilising University of Canterbury resources for an outreach programme. At the same time I entered into discussions with Tim, Janine and others regarding the establishment of a New Zealand registered charitable trust to facilitate our activities. This was the beginnings of EcoCARE Pacific Trust and the expression of what was to become 'Enpovigo'. The formation of EcoCARE Pacific Trust is dealt with in greater detail in Chapter 5. Suffice to say that its formation was designed to facilitate and initiate projects and programs in collaboration with, and at the request of, impoverished communities and nations.

Initial Projects

Resource Acquisition and Distribution

At the request of the government and communities of Tonga, EcoCARE was tasked with trying to support development with and for the people of Tonga. After researching issues around

resources for education and health in Tonga it became apparent that there were significant shortages of almost all resources in these areas. Although we knew there were significant issues surrounding resource availability we were concerned that we should not be an organisation that thinks it knows what the issues are, and as a result ends up collecting and distributing goods that are not really necessary. Consequently, we asked school children to write short notes about what they would like for their schools. In almost every case they asked for the simplest of resources: pencils, pens, rulers, paper and the like.

EcoCARE's first foray into supporting Enpovigo began with the acquisition and distribution of educational resources through the Ministry of Education in Tonga. This program has remained a fundamental aspect of EcoCARE's activities and the enabling of Enpovigo. Our first shipment of goods was to the Ministry included 104 decommissioned computers (donated by the University of Canterbury) along with other instruments, pens, pencils paper and books (donated by the Christchurch City Council). These resources were distributed amongst all Tongan schools regardless as to whether they were government schools or Christian mission schools. The resources were distributed to schools on the main island and on the more remote Ha'apai and Vava'u groups of islands. The collection and distribution of health and educational resources is an ongoing programme and in the case of educational resources EcoCARE has partnered with a local company to help fund the shipment of goods as part of an educational prize package for a national science competition discussed in detail in Chapters 1, 4 and 5.

Safe Water

The main "basic needs" issues that I identified in Tonga related to safe water access. Subsequently, a collective of people overseen by Dr Tim Phillips (EcoCARE Pacific Trust co-founder) including a plumber, an electrician and a builder were able to design an appropriate and targeted "safe water" solution. Once a solution had been identified we were able to obtain access to funds that enabled EcoCARE to address this need in five remote island communities. The

majority of communities in Tonga meet what are considered to be the traditional list of basic needs that include food, shelter, clothing and water and a number of researchers have suggested that before development can proceed these basic needs must be met. However, during conversations with local people on Tongatapu we were made aware of issues surrounding safe and palatable water for communities located on the islands of the Ha'apai group. Local people and local medical practitioners had mentioned that there had been numerous incidences of typhoid contamination of ground water and that such problems occurred frequently in communities residing in low lying areas. Many island communities rely on ground water from the freshwater lens that is formed under the islands as their main source of drinking water.

The Ha'apai group of islands is located between the Tongatapu group to the south and the Vava'u group to the north. It is made up of 51 islands 17 of which are inhabited, the 2006 census showing that 7,570 people lived in it. The main town of Pangai, which is located on Lifuka Island has a population of nearly three thousand people and is less than ten metres above sea level. Unlike the Vava'u group and the Tongatapu group of islands where the ocean floor drops away quite quickly into one thousand metres of ocean a relatively short distance from the shore, the bathymetry around Pangai is very shallow. The geography and bathymetry of the communities on Ha'apai means that it is almost impossible to establish a sewage system in which treated effluent can be piped to deeper water offshore.

This scenario means that local communities in the Ha'apai Group have to rely on septic tanks that are placed underground. Under normal circumstances these tanks are emptied every 2-3 years and the waste is either processed and piped through an "outfall" to deeper water, or pumped into a pit on higher ground. The collection and disposal of raw effluent waste is not always possible for poor remote island communities like those in the Ha'apai Group resulting in waste tanks remaining full. During storms, sea water will often encroach on the freshwater lens, with water flowing into the in-ground tanks causing effluent to flow out and into the ground water, causing outbreaks of typhoid and other diseases. I became aware of the seriousness of this problem during an EcoCARE Pacific Trust visit to Ha'apai. As a result EcoCARE began a "Safe Water" programme to design and implement water filtration systems in schools and hospitals throughout Tonga.

After carrying out a series of presentations requesting help from the Christchurch Canterbury Club and the Papanui Rotary Club we managed to secure a small grant to install a water filtration system and reverse osmosis desalination plant in the hospital in Pangai. The safe water system was designed by EcoCARE collaborators and included an electric-powered pump and a 240/12 volt inverter[92]. At the time of the installation of our first water filter system in 2006 there was no safe water for the people in Pangai. EcoCARE has now installed safe water systems in five high schools as well as the hospital in Pangai. The program is ongoing with another water station to be installed in 2018.

Funded Research

Enabling the immense expertise and knowledge that is housed in tertiary institutions to participate with impoverished and developing nations has been an ongoing concern of mine since 1986 when I first undertook tertiary studies. The potential is undeniable and their inability to realise that potential for the benefit of impoverished nations is obvious. As I began to understand the parameters under which tertiary institutions operate, the immense overhead charges they request and the restrictions imposed by many funds on the payment of such large overheads I began to search for different options and possibilities. As elaborated upon in Chapter 5 the formation of EcoCARE Pacific as a New Zealand registered charitable trust and NGO (Non-Governmental Organisation) among other things, gave it the opportunity to access funds that were not available to universities and governmental organisations. As an NGO EcoCARE is able to access and disburse funds to researchers employed by institutions like the University of Canterbury so that researchers and students of these institutions are able to participate in research programmes that address specific issues in impoverished third world nations like Tonga. As described in Chapter 5 the programmes are designed to remain sustainable over time. A detailed list of projects with which EcoCARE Pacific has been involved subsequently is provided in the body of the thesis and will not be repeated here.

In summary, Enpovigo provides an innovative philosophical basis upon which EcoCARE Pacific Trust operates and the developmental strategies provided under Enpovigo help to ensure

[92] The inverter enables the system to run from the 240 volt mains power or in the case of power outages from a 12 volt car battery. The system includes low tension leads to attach to a car battery.

that projects are chosen predominantly by local people and that sustainability is built into them through extensive involvement of local people at all levels. The goal of Enpovigo and activities of EcoCARE are therefore to support the building of capabilities and capacities through the use of renewable energies and ICTs so that local people are better able to achieve greater personal and utilitarian happiness through their ability to make better choices

Appendix 2 Letter of endorsement by Cabinet of Tonga

Palemia 'o Tonga

To Whom It May Concern,

The Government of the Kingdom of Tonga has been involved recently in a series of meetings with trustees and representatives of EcoCARE Pacific Trust. During these discussions trustees outlined a series of issues and presented potential solutions to them that we, the representatives of the Tongan people, believe to be worthy of development and funding. We support and endorse EcoCARE Pacific Trust in its endeavours to establish funding for projects endorsed by us.

EcoCARE Pacific Trust is an altruistic, non-profit organization, whose purpose is to support and facilitate health, environmental and educational initiatives in the Pacific region.

The Tongan Government is satisfied that EcoCARE Pacific Trust's activities are supported by the New Zealand government and have been formally endorsed in letters of support from The New Zealand Minister of Health, The Honourable Annette King, The New Zealand Director General of Health, Dr. Karen Poutasi, and the New Zealand High Commissioner to Tonga, Dr. Michael McBryde.

Representatives of the trust have attended meetings with the Deputy Prime Minister of Tonga, The Hon. James Cecil Cocker, The Minister of Health, The Hon. Dr Viliami Tangi, and the Minister of Education, the Hon. Rev. Dr. Tevita Hala Palefau. They have also attended a special meeting with members of Cabinet.
Our government wishes to acknowledge that the networked expertise of EcoCARE Pacific's trustees is ideally suited to support the trust's stated purposes as noted above.

The Tongan Government values the fact that EcoCARE Pacific's trustees are individuals who occupy positions of trust, responsibility and accountability in their own country and that their activities in the Pacific are entirely altruistically motivated. We are satisfied that EcoCARE Pacific Trust's commitment to transparency, accountability and fastidious audit processes is entirely congruent with the stated intentions of the trust.

GPO Box 62, Nuku'alofa, TONGA. Telephone: (676) 23 306; email address:pmomail@pmo.gov.to; Fax: (676) 23 888

We also appreciate that the mechanisms of the Trust are formatted to ensure that all trust processes are grounded in sound ethical principle and that this supports the highest levels of accountability and transparency in their activities.

Our government specifically values the cultural sensitivity that is integral to EcoCARE Pacific's processes and the Trust's stated intention to work within, honour and support the cultural boundaries of Pacific peoples.

As a government, we recognise the benefits that the trust is able to bring to the people of Tonga through its diversity of expertise and energetic desire. We recognise that the mechanisms that EcoCARE Pacific Trust has in place means that the Trust is able to apply for and manage funding on our behalf. We recognise that these mechanisms will also ensure that all funding will reach its stated target, and that this in turn, will help to validate and support the integrity of our own governmental processes while enabling the Tongan people to access funding that might not otherwise be available.

Applications for the funding of EcoCARE Pacific's Tongan projects will be able to proceed only with the permission and support of the relevant Tongan Ministry and as a consequence The Tongan Government will have the authority to determine what activities are undertaken by EcoCARE in Tonga.

Yours sincerely,

PRIME MINISTER'S OFFICE * NUKU'ALOFA *

Hon. James Cecil Cocker
ACTING PRIME MINISTER

GPO Box 62, Nuku'alofa, TONGA. Telephone: (676) 24 644 email address: pmomail@pmo.gov.to; Fax: (676) 23 888

Appendix 3 Letter of Endorsement from the Minister of Education in Tonga

THE MINISTER OF EDUCATION

Hon. Rev. Dr. Tevita Hala Palefau
BSc GCEd. (Fiji), PGDip ScEd, MSc (Aust), PhD (Canada)

Ministry of Education
P.O. Box 61
Nuku'alofa
KINGDOM OF TONGA

4 April 2005

Professor Rov Sharp
Vice Chancellor
University of Canterbury
Private Bag 4800
Christchurch
NEW ZEALAND

Dear Sir

The Government of the Kingdom of Tonga has recently been involved in a series of meetings with the Directors and representatives of EcoCARE Pacific Trust. EcoCARE Pacific Trust is an altruistic, non-profit organization, whose goal is to support and facilitate health, environmental and educational initiatives in the Pacific region.

The Trust has attended meetings with the Deputy Prime Minister, Minister of Health and myself, as well as a separate meeting with members of Cabinet. Although it was not the specific agenda of these meetings, the potential for the involvement of New Zealand universities in educational programs in Tonga was discussed, and it was agreed that such an involvement might be mutually beneficial to both parties.

I am writing to encourage a formal application for educational activities to be lodged with the Tonga Government through EcoCARE Pacific Trust. The relationship that the Trust has already established with the Tonga Government will help to ensure that any such requests are able to be expedited.

I sense the potential for a meeting between yourself and representatives of the Tonga Government, and EcoCARE have indicated their willingness to facilitate the arrangements for such a meeting. It would be interesting to discuss the possibility of the University entering into a collaborative relationship with the Tonga Government and the people of the Kingdom of Tonga.

TEL (676) 23-903; FAX (676) 23-866; e-mail: minofed@kalianet.to

Appendix 4 Letter of Endorsement from the Minister of Health and the Environment in Tonga

HON. DR. VILIAMI T. TANGI, F.R.A.C.S.

Office of the Minister of Health

2nd April, 2005.

TO WHOM IT MAY CONCERN

SUBJECT: EcoCARE PACIFIC TRUST

This morning, I met up with three trustees from EcoCARE Pacific Trust. This is their first official visit to Tonga in relation to the vision and overall objective of the trust.

I understand that perhaps one of the aim of the trust is to involve in educational activities at communities level with formative evaluations of what is going on and if indicated, offer better alternatives.

An example brought up in the discussion was that related to plastic bags and disposal nappies. These are causing a lot of environmental problems in the country. EcoCARE Trust can involve in educating the public in all aspects regarding these problems for example, hence helping the country as a whole in the process. There are a lot more issues brought up in the discussion which I believe will benefit us here in Tonga.

EcoCARE Paciific, I understand, is a profit trust organization, and is trying to help the pacific island countries especially in areas relating to environment and health.

As the Minister of Health and current Chairman of the National Waste Management Committee, I am delighted at the prospect of working together with EcoCARE Pacific. After this initial discussion, I believe they are addressing issues that are of great importance to us here in Tonga.

In that context, I fully support the overall goal of EcoCARE Pacific and wish them success for I understand that communities as a whole will benefit from their work.

With kindest regards.

Yours Sincerely,

.....
Dr. V. T. Tangi

MINISTER OF HEALTH
TONGA

Ministry of Health, P.O. Box 59, Nuku'alofa, Kingdom of Tonga. Tel:(676)28-233 . Fax:(676)21-337 . E-mail Address:billmoh@kalianet.to

Appendix 5 Letter of Endorsement from the New Zealand High Commissioner in Tonga

NEW ZEALAND HIGH COMMISSION

TE AKA AORERE

NUKU'ALOFA

22 July 2005

TO WHOM IT MAY CONCERN

In April 2005 I met members of the EcoCARE Pacific Trust during their visit to Tonga. They also met separately with Tongan Cabinet Ministers. They explained the goals of their Trust and outlined the activities they wished to carry out in Tonga.

I am confident that the implementation of the goals of the Trust would be of benefit to the people of Tonga and would usefully complement the development assistance programmes of external donors such as the New Zealand Government. The proposed initiatives in the environmental, educational and health areas seem to be particularly suited to Tonga's needs.

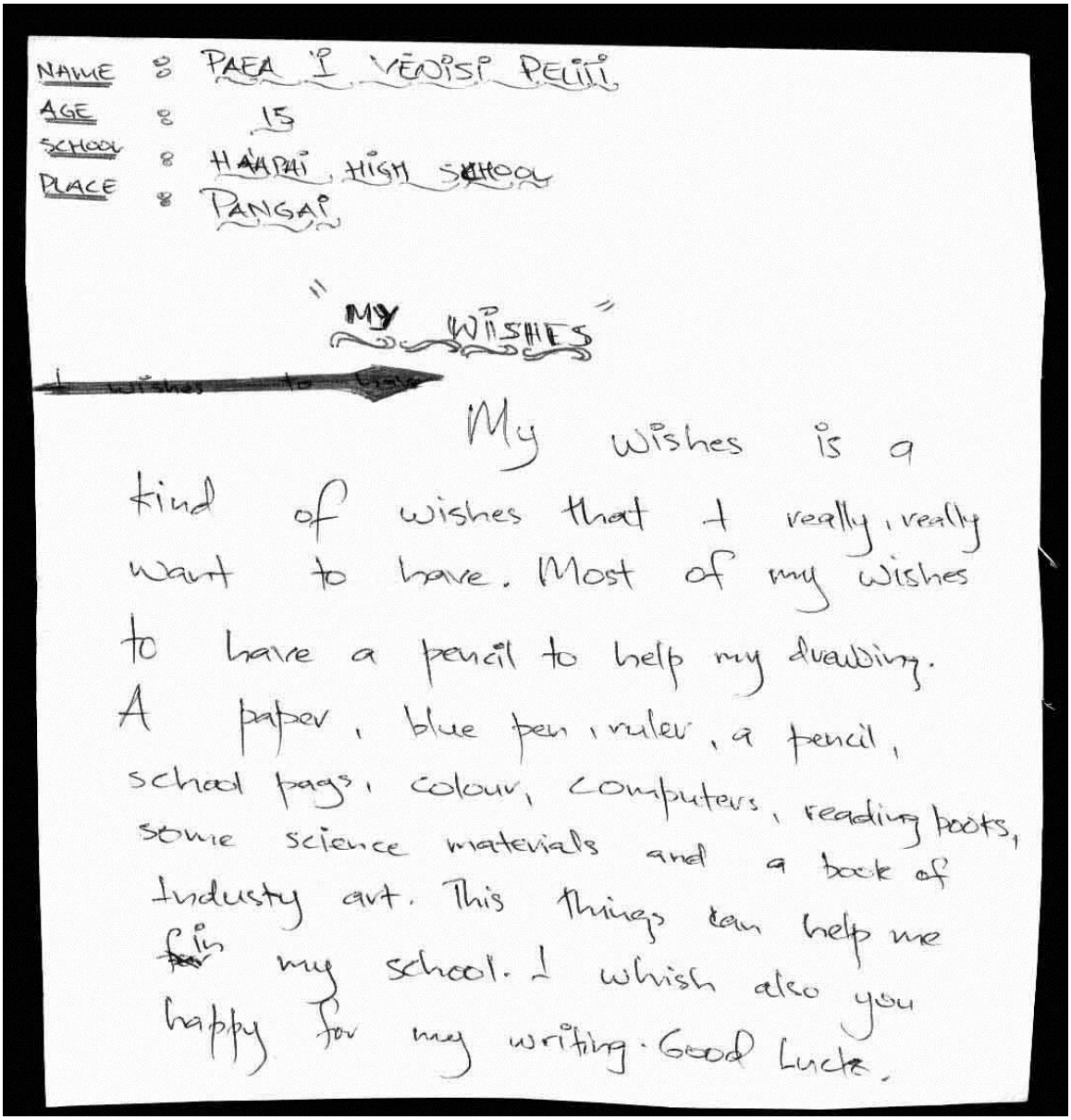
I wish the Trust members well in their quest to secure resources for the implementation of their goals.

Michael McBryde
High Commissioner

CORNER TAUFA'AHAU AND SALOTE ROADS PO BOX 830
NUKU'ALOFA KINGDOM OF TONGA
TELEPHONE (00676) 23122 FACSIMILE (00676) 23487

0017003

Appendix 6 Letters from school students and Ha'apai High School requesting educational resources



NAME : PAEA 'I VENISI PELITI
AGE : 15
SCHOOL : HAAPAI HIGH SCHOOL
PLACE : PANGAI

"MY WISHES"

I wishes to have

My wishes is a kind of wishes that I really, really want to have. Most of my wishes to have a pencil to help my drawing. A paper, blue pen, ruler, a pencil, schaol bags, colour, computers, reading books, some science materials and a book of Industry art. This things can help me ~~for~~ in my school. I whish also you happy for my writing. Good Lucke.

Ruben Yam.
13.
Haápai High School.
Haápai

My Wishes.
- I wish to make pata for school. Because I'm hungry in ~~tough~~ lunch time.

Pala Taimikovi
14 years old
Haápai High
~~Fotuhaa~~ Haátoú) Haápai
My ~~whiches~~ wishes

My wishes is pen
rulor, paper, ~~gentle~~ brown ~~sandle~~ sandal
school uniform, school back, bicycle.

Name:- Pitasoni Vakameilalo.
AGE:- 15.
SCHOOL:- Haápai High School
PLACE:- [~~Haápai~~] Pangai

MY WISHES.
- I wish to have a pen {blue, black, red}.
- computer
- ruler
- paper
- brown sandles

ST JOSEPH'S COMMUNITY COLLEGE

Phone/Fax: (676) 60 500

P.O. Box 10
Pangai, Ha'apai
TONGA
South Pacific

27th September 2006

To Whom It May Concern

Dear Sir/Madam

I have been working for this small Non-government school, situated in the outer island of Ha'apai, Tonga. This is a very small school with an average of 140's student a year though the number varies throughout the years.

I am not an ex-student of the school nor grew up in this Island. I am from the main island of Tongatapu, but I became to love this school very much. Part of this love came from an understanding that the students from this island desperately need help which is more costly when moving to study in the main island.

However, the resources to be used for their studying are constraints to achieving a better career in the future.

For example, at the moment there are four to five students using only one computer during the computer classes, we have cut down photocopy of notes and exercises because fullscapes are expensive to us. The Home Economics students face difficulty with their practical work because they have no oven (stove), only two sewing machines and poor utensils. The agricultural students can't do their practical because we can't fenced our bush allotment. The same problem goes to the Industrial Art, Science department, library etc.

The main problem with this school is the financial situation since the maintenance and the general operational cost of the school relies heavily on the parents who earn their living from weaving mats and fishing for the local market.

On behalf of the students, teachers and the parents, I would like to ask for your help to the students we are taking care of. It will be a blessing for use knowing that some people around the world still have the love for those in needs. Any assistant that you might give us will be received with much appreciation.

We can use your help to provide these students with a better education.

Once again may I thank you in advance for your help.

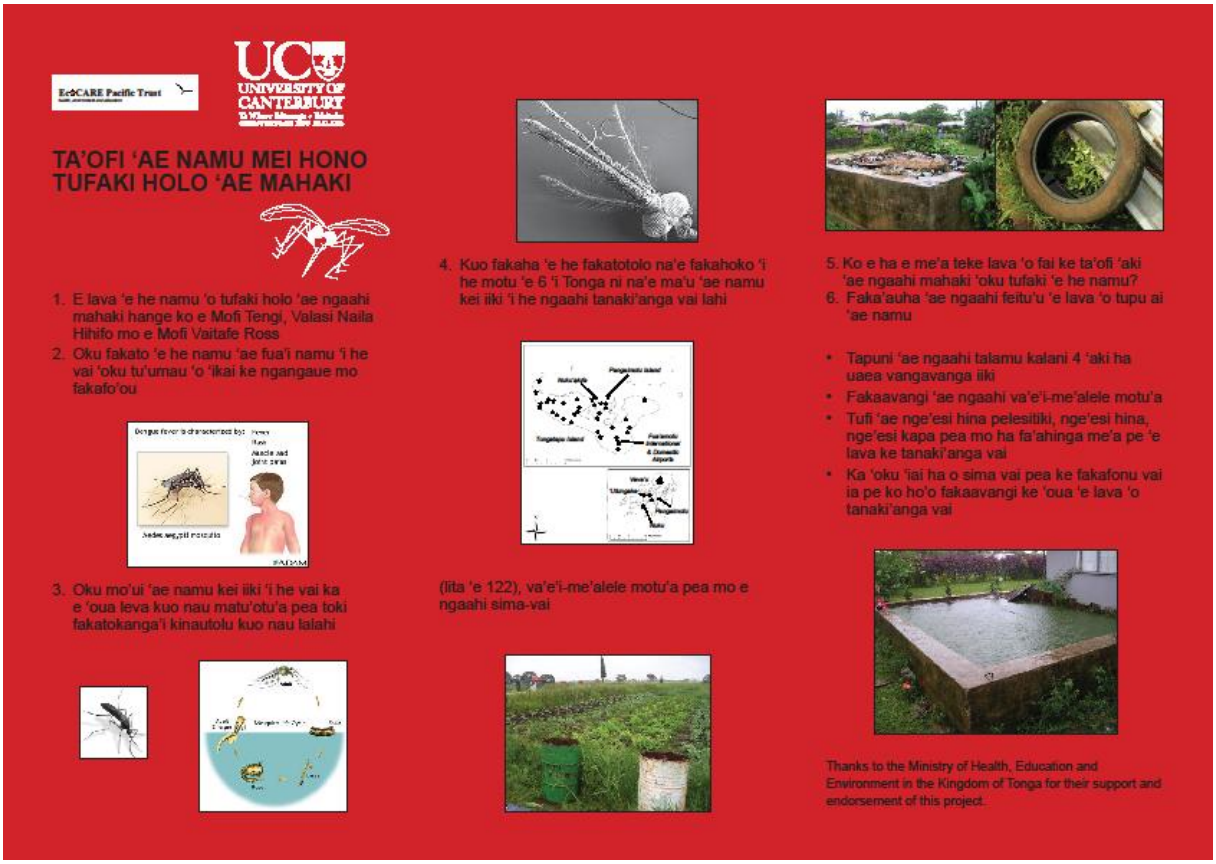
Yours sincerely

ST. JOSEPH'S COLLEGE
TONGA

.....

Paulo Manu
(Principal)

Appendix 7 Multilingual brochures and poster for dissemination of information from invasive mosquito project



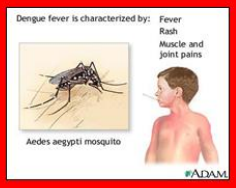
EcoCARE Pacific Trust
Health, environment and education

UC UNIVERSITY OF CANTERBURY

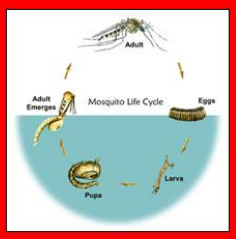
STOP
MOSQUITOES FROM SPREADING DISEASE

1 . In Tonga mosquitoes can spread diseases like Dengue Fever, Western Nile Virus and Ross River Fever.

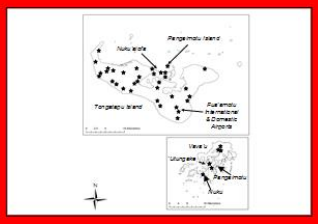
2 . Mosquitoes lay their eggs in still water



3 . The young or larvae live in the water until they mature and emerge as adults



4 . A study of 42 sites on 6 islands throughout Tonga showed that young mosquitoes (larvae) were found in many containers that held water.



A lot of young mosquitoes were found in 44 gallon (122 litres) drums, old car tyres and concrete water tanks.

5 . What can you do to stop mosquito borne diseases?

6 . Remove places where mosquitoes might breed;

Cover any open 44 gallon drums with mesh.

Put holes in any old car tyres so that water drains out.

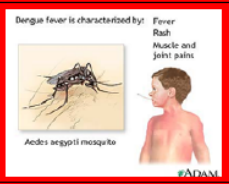
Pick up waste plastics, bottles, cans and other containers that can hold water.

If you have any old water tanks that hold water fill them in or drill holes in them so that they don't hold water.

Thanks to the Ministry of Health, Education and Environment in the Kingdom of Tonga for their support and endorsement of this project.

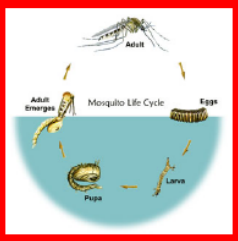
STOP
Mosquitoes from Spreading Disease

In Tonga mosquitoes can spread diseases like Dengue Fever, Western Nile Virus and Ross River Fever.



Mosquitoes lay their eggs in still water

The young or larvae live in the water until they mature and emerge as adults



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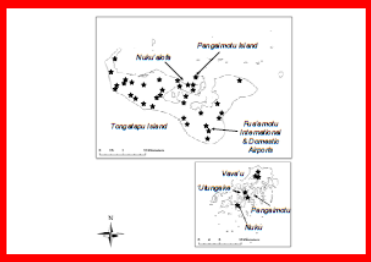

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What can you do to stop mosquito borne diseases?

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Thanks to the Ministry of Health, Education and Environment in the Kingdom of Tonga for their support and endorsement of this project. Thanks to CEPF for funding this project and PII for their support.

EcoCARE Pacific Trust
health, environment and education

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