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Building Primitive But Effective
Structures in Remote Areas

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In April last year I was up in the Himalayas and while camping at 13,000 ft. I was laid low with pulmonary oedema (altitude sickness) and for a week I wasn't at all well. I was finally helicoptered out to Kathmandu and soon recovered at the lower altitude.

A few weeks later I was back at my home in Auckland, New Zealand, and I received a very nice letter from a pleasant gentleman in the United States. I thought I might read part of it to you. He said "Yesterday while in my car on my way to work I caught a bit of news that prompted me to write this letter. I heard that you were taken out of the mountains of Nepal by helicopter with altitude sickness. They went on to say you are 72 years old.

Well I've got to tell you that was good news to me. I thought you were dead several years ago."

Over the years I have been involved in a number of major expeditions and in many minor adventures too. Sometimes the small adventures can be almost as exciting as the great challenges.

As a youngster I read many books on adventure and I resolved that some day I too would find and meet my challenges. I was under no delusions that I had exceptional ability but I was physically strong and had plenty of motivation.

Mountaineering gave me some of the happiest days in my life. I was frequently afraid but I discovered that fear was a stimulating factor - it stirred the blood in the veins and enabled me to stretch my abilities beyond my normal capacity. I was learning not only to defeat the mountains but overcome my own fears as well.

We are constantly hearing the call for sustainable development and very important it is too. Many crimes against man and nature have been committed in the name of ordinary development. Government and private enterprises can be obsessed with building roads, damming beautiful rivers, logging great rain forests without deep consideration of whether such acts are necessary or justified. In Nepal there is an unbelievable urge to build roads through steep mountain areas for little economic benefit to the country. It results in severe erosion to the hillsides; the villagers drift into desperate slums lining the roadsides; and it results in work being taken away from local people. And what benefits are there? It makes it a little easier to administer hill villages which are peaceful enough anyway and it encourages the drift from the country in to the city. I feel that much of such so-called development is irresponsible. And, of course, in many cases is not being paid for by local Government but by foreign aid.

One thing that horrifies me in Nepal is that plans are now being finalised to build a road deep into the Solu Khumbu district where I have established medical clinics and schools - a beautiful remote area. The next move no doubt will be to continue the road up the great valley of the Dudh Kosi River to the foot of Mt Everest itself - an idea that depresses me beyond belief. What possible justification can there be for such roads and how utterly irresponsible of the foreign countries or agencies that are supplying the finance without fully considering the effects of the project.

I am thankful that I will not be around to see that completion of the project.

Perhaps I had better get on with my lecture titled "Building Primitive but effective structures in remote areas". I will illustrate it with colour slides.

In March 1953 we arrived in Kathmandu to make all our preparations. In those days Kathmandu had the appearance of an ancient city with a multitude of religions and cultures and much beautiful wood carving and beautiful buildings.

We set off on our 17 day walk to the Everest region climbing up and down over great Himalayan ridges with mighty peaks like Gauri Shankar pushing upwards on the Tibetan border. We crossed the Taksindu Pass at 10,000 ft and camped high above the valley of the Dudh Kosi river - the river that drains the south side of Mt Everest. It forms a spectacular gorge, a gorge that in those days was heavily clothed in forest (now alas severely denuded).

We moved up the valley which at this time of the year was brightened with a multitude of blossoms. Crimson rhododendron was the most common - square miles of it covering the steep hillsides. Equally spectacular were the Himalayan Magnolia - up to 60ft high and clothed in great waxy blossoms - some of them a foot or more in diameter. In the high mountain pastures you could find the rare Meganopsis, the beautiful Himalayan blue poppy.

We reach the upper Khumbu valley and see the summit of Mt Everest towering above the great Nuptse/Lhotse wall. Two months later Sherpa Tenzing and I stood on the summit of the world.

I had built up a close relationship with the Sherpas of Nepal. I admired their courage, their strength, and their sense of humour in this tough and rigorous environment. I did not feel sorry for them - far from it. But I quickly realised that there were many things they lacked in their society that we are inclined to take for granted - no schools, no medical facilities.

In 1961 I asked a group of Sherpas -if we could do something to help what would it be. Sherpa Urkein spoke on their behalf "Our children have eyes but they cannot see. They must have education. It was universally agreed that a school in the large village of Khumjung was essential.

I raised the necessary money in the United States, was given an aluminium building by the Indian Aluminium Company in Calcutta and transported it in to Khumjung with considerable effort. We had detailed instructions but assembling the building wasn't easy - at the conclusion we had one extra sheet of aluminium left over and we never did find where it was meant to go.

We invited the Head Lama of Tengpoche Monastery to carry out the opening ceremony and he arrived with a number of his monks plus trumpets, drums and symbols. There was much chanting of prayers and it was altogether a happy and noisy occasion. 40 rather scruffy Sherpa children were the first to attend the school. But now the buildings have increased in number and there are more than 400 students.

Finally the school reached High School level and two extra buildings were need. We were now using more sophisticated building techniques - squaring the local rocks and cementing them together; ceiling to support the roof; concrete floors mixed and carried

by hand in 4 gallon tins. Finally the two buildings were complete - simple but effective structures.

The opening ceremony of the High School brought a huge crowd of students, parents and village elders. There was much laughter and dancing and imbibing of the local beer. My son Peter was there with me and we thoroughly enjoyed the occasion. We had constructed simple desks for the senior students and they were fairly comfortable.

The people in the Khumbu had asked for help with a hospital and this seemed a reasonable request. But how to get all the building materials in to Kunde? I decided we would find a suitable site a little down valley and establish a mountain airfield. After much searching we found a site in the little side valley of Lukla - a series of terraced potato fields rising quite steeply up to a great mountain wall. We had no mechanical equipment. I employed a hundred Sherpas to dig and chop, levelling out the terraces, burying rocks, and stamping the soft surfaces into firmness. Finally it was finished 1200 ft long and 100 ft wide rising a hundred feet from bottom to top. Both landing and taking off was an exciting experience for the passengers - but Lukla has now become the busiest mountain airfield in Nepal.

A little further up valley at the village of Phakding the bridge over the Duolh Kosi river was washed out in every monsoon season. The local people asked for help in building a more substantial structure. We brought in from New Zealand two long steel wire ropes.

The basic bridge was cantilevered each end in typical Sherpa fashion. Then we built two tall creosoted towers and looped the wire ropes over them to suspend the centre of the bridge. It proved to be a very stable structure and a dozen heavily laden porters or half a dozen yaks could cross together in safety.

For several years the bridge weathered a number of monsoon seasons. But then came the disaster! High up in the mountains a glacial lake burst its banks and a forty foot high wall of water rushed down the valley carrying a multitude of tree trunks with it. It washed out a dozen bridges including our Phakding bridge. Clearly a much higher bridge was needed and the Nepalese Government financed a substantial steel suspension bridge.

The Kunde hospital was the biggest structure we had built up to that stage. It had an internal wooden framework lined with plywood and surrounded by 2ft wide loose rock walls. There were many medical problems in the Khumbu. TB was very frequent and stomach disorders due to lack of hygiene. Goitre too was very prevalent - not only bulging throats as in this lady but mental retardation in children due to the lack of iodine in the diet. We had a team of doctors under Dr Kay Ibbertson who injected virtually everyone with iodised oil and have more or less eradicated goitre in the Khumbu.

The hospital operated well for a number of years with volunteer New Zealand doctors. But then a severe earthquake shook Nepal and the walls of Kunde hospital became very unstable. We undertook a substantial rebuilding program, strengthening the walls, enlarging the doctors quarters and building another structure for storage of fuel, building materials and drugs. Work was carried out in most unpleasant conditions with frequent falls of snow but our determined building team continued to the end.

We now had a septic tank and a flush toilet, the inside walls were repainted and the surgery made very clean, bright and functional. The final building has proved most effective. We have solar heating to produce hot water for showers, laundry and cooking. Solar panels charge batteries with electricity for operating radios, a computer, and even X-ray. Khunde Hospital is a small but very effective operation.

One of the major problems in the Khumbu has been the destruction of the forests. For a dozen years the Himalayan Trust has been carrying out a re-afforestation program. A number of nurseries have been established and we have planted out 60,000 to 100,000 seedlings a year. For several years now experts from the Forestry Research Institute in Rangiora have been coming to Nepal and their advice has been invaluable. We now grow the seedlings for 3 years before they are planted out and we bring ample supplies of water in plastic pipes to the nurseries.

We have enclosed extensive areas of steep barren hillsides with rock walls and planted seedlings but at this high altitude growth has been very slow. But suddenly in the last few years the trees have shot ahead. It has been most encouraging and we don't quite know if it has been due to the expert attention of FRI or just time - maybe it is both. Many of the trees are now 2 to 3 ft high and some of the older ones are 4ft to 10ft in height. Growing trees is a very long term business but now at last we are seeing signs of positive progress.

From the central administrative village of Namche Bazar we head up the Thami Valley. We visit the small primary school at Thamo our most recent building of the 26 schools we have now built. Another half days walk takes us to Thami village under a great mountain range. Some years ago we constructed a moderate size school here - an internal wooden framework enclosed with rock walls and with a corrugated aluminium roof and skylights. This building has 5 small classrooms and a rather larger medical clinic. We have found this combination of education and health care is a very successful one.

The opening ceremony is always a happy occasion and it certainly was at Thami. I was firmly placed on an appropriate rock and the senior village elder came forward and removed from his Bakhu (the Sherpas traditional robe) a bottle marked Johnny Walker. But it no longer contained Johnny Walker but the Sherpa's distilled firewater called Arak. He also removed a large dusty glass and filled it to the brim. He handed this to me and gestured to me to drink it down. I had no wish to offend the gentleman so I poured it down and it burnt its way into my stomach. I handed the glass back and he filled it up again and gestured once more. Once again I poured it down. A third time he filled it - but I knew the local custom, I didn't have to drink it this time. I could just wet my lips or dip my finger in the Arak and flick a few drops into the air in case some minor god should be passing by and enjoy it. Then the senior elder stowed the bottle and glass back in his Bakhu and stepped aside.

Now it was the turn of the next most senior elder and the same procedure was followed. By the time five or six village elders had carried out this formality I was in a very jolly frame of mind indeed.

Then all the young students stepped forward and presented us with white scarves (or kartas as they are called) or Leis of flowers.

By the time they had concluded this we were a most unusual sight. But at least there was no doubt that the children and their parents appreciated what we had done for them.

High above the school on the steep mountainside was perched Thami Monastery. We were very friendly with the young Head Lama who was a Rimpoche (a re-incarnated Lama). He expressed his concern about the steep slope in front of the monastery which was becoming unstable and he was very much afraid that the Monastery might go sliding down the mountainside. Would we strengthen the slope, he asked. One of the members of our party was an engineer - I believe it was Norman Hardie who may well be here this evening. Norman examined the problem and came up with a reinforced steel and concrete structure similar to the Benmore Dam. Even Norman realised that this was impractical in this remote area at 14,000 ft. So we settled for a simpler structure - what I call farm engineering. Literally hundred of tons of rock were broken with sledge hammers and established a great sloping wall six to ten feet deep built up against the slope. Periodically we would lay heavy wire netting across the wall and then frequently tie the outside rocks with No.8 wire back into firm parts of the slope. It was a massive operation but to date has been very successful. For ten years now there has been no sign of movement and the Thami Monastery seems safe for generations to come.

The biggest and most important Monastery in the Khumbu area is Tengpoche with a magnificent view of Mt Everest at the head of the valley. The Rimpoche of Tengpoche approached me with a problem. He had 23 young monks who needed educating. Would we assist with constructing a school building? He took me around the back wall of the monastery where he wanted the school built and after much thought I agreed and work commenced. Everything was done by hand. Rocks were broken with sledgehammers and carefully squared. Timber was handsawn and carried in to position. Doors and windows were painted by the lady members of our party. My brother Rex who is a builder by profession supervised the operation and slowly the walls rose up. At that time I was NZ High Commissioner to India and had to get back to Delhi to welcome a NZ Cabinet Minister. Rex and I agreed that the school would be finished in two weeks time - we would return for the official opening.

And return we did on the agreed date by helicopter. We land on the pad at the edge of the great drop to the valley below. The Rimpoche and Rex were there to meet us - the school had been completed late the previous evening. The Rimpoche led us up the steps beside the Monastery and placed June and myself in places of honour. There were many speeches to celebrate the opening ceremony and then the formal opening was carried out. Rex had tacked a piece of red cloth across the main door and I was given a pair of scissors and duly snipped the cotton.

We walked around the building and admired its strength and colour. We went inside to view the classrooms, the sleeping quarters and the kitchen. We felt proud of a good job well done.

For three years the school served a very useful purpose educating the young monks. And then on February 1989 disaster struck. The Monastery caught on fire and both Monastery and school were burnt to the ground. A Canadian trekker camping outside the Monastery took these photographs in the darkness. The fire had resulted from the introduction of modern technology. The American Himalayan Foundation based in San Francisco had raised \$US100,000 to establish a mini-hydro scheme. I am a Director of this Foundation and although I expressed my concern we failed to train any monks or

Sherpas in safety with electrical appliances. A heater had been carelessly turned on in a room full of daphne paper and it had burst into flames.

Two days after the fire June and I helicoptered in to view the still smouldering ruins. Our Sherpa friends and the Lamas were distraught. An old Lama who I had known for many years threw his arms around my shoulders and wept! "Tengpoche must rise again" said the Sherpas "Will you help?" So what could I do?

The Sherpas themselves have raised \$50,000 US - a fantastic sum for people who are far from well to do. I have been travelling the world encouraging people and organisations to contribute to the new monastery and great generosity has been shown. We have raised \$350,000 U.S. making a total of \$400,000 U.S. This is probably enough to complete the main buildings and the painting inside and out. Only the replacement of the sacred relics will remain.

But work is going rapidly ahead. Ten thousand pieces of timber have been cut and planed in the lower valleys and carried for two days and 3 or 4,000 ft up the steep tracks to the Monastery at 13,000 ft. Huge quantities of rock have been broken and squared.

Last year we were back in Tengpoche for the blessing of the Foundations by the Rimpoche. We laid a special stone in each corner. This year in March we flew back again. From the helicopter the Monastery looked magnificent. The Head Lama and his senior monks were lined up with silk scarves to greet us. Tremendous progress had been made and carpenters with their simple hand tools were working everywhere. The main plans had been drawn by an experienced English Architect but the chief builder was a Sherpa with vast experience of building Monasteries.

The squared rock was particularly impressive supervised by my chief Sherpa Mingmastering and cemented together with 500 kg bags of cement carried in by porters for 12 days from the roadhead.

We circulated around the building. Clearly it was larger than the old building. Inside were great beams supporting the ceilings and floors and highly decorative woodwork around the windows. The outside walls have still be painted a traditional red.

But when all is completed the Tengpoche Monastery will be a great sight in its magnificent location on the crest of a spur.

To the Sherpas Tengpoche is an enormously important religious and cultural centre. All of us in the Himalayan Trust feel a great sense of satisfaction that we have contributed energetically to its re-building.

Perhaps our greatest satisfaction is knowing that we have not inflicted our ideas and culture on these tough mountain people - we have nearly always responded to their wishes and ambitions.