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Meeting New Challenges: Agenda for the Future from a Development Perspective

Climate Change and the Hindu Kush-Himalayan Region: Implications for Agriculture, Food, Poverty and Livelihoods

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Pakistan should be eternally grateful to the mountain regions for they provide life to the plains of the Indus in the Punjab and Sind provinces of Pakistan. The mighty Indus and its western tributaries are the irrigation system of Pakistan. The country is held together by this irrigation system, which provides the people with enough food to meet their needs. Pakistan's largest dam is situated on the Indus at Tarbela with an initial capacity of 7.63 million acre feet (maf) of water. When the dam came into operation, Pakistan's GDP jumped by about 87% and helped a food deficit country that was surviving on PL 480 (food aid programme) handouts to come to terms with itself.

The Tarbela dam is snow filled and depends on glacier melt for its flow of water. This year the melt has been excessive and the rivers of the regions are in high flood. This means an excess of water, but it is also a warning that the glaciers are receding. As a student I recall walking on the glaciers in the month of August, and as late as 1987, I recall that snow and glaciers nearly made us abort our mission to Gilgit and Hunza, the two major cities of the region. Last year I was shocked to find that glaciers were nowhere to be seen in the Hunza region. If we compare the experience of 1987 with that of 2007, then the glacier and snowmelt has been so excessive that the receding snow line is now roughly 1300 kilometres away (give or take 5% either way).

There is another danger facing the country and no one has yet taken note of the potential consequences. The Tarbela has decreased its storage capacity by 2.5 maf. The farmers in the plains have been demanding that another dam be constructed at Kalabagh without realising that the dam can only be useful if there is more water. Due to poor watershed management, an estimated 67 million tons of silt from eroded land enters the Tarbela dam each year; what amount leaves the dam is not known, nor is any effort made to determine this. The silk route poses another danger: that of landslides, with approximately 100 occurring each year along the route. These landslides occur due to manmade activity. While developing this road, engineers blasted the fault line in the ranges instead of circumventing it, but then engineers will be engineers. All this mud is

thrown in to the Indus River as there is no other alternative. This earth eventually finds its way into the Tarbela dam.

The proposed dam at Kalabagh is not additional, but a replacement for the lost storage capacity of the Tarbela dam. Despite repeated commitments by the Government, the Kalabagh dam has now been shelved for the time being. In its place, the Government has suggested the Bhasha dam, situated at the border of the North West Frontier Province (NWFP) and the Northern Areas. The site for this dam is very near Chilas and the President of Pakistan has already performed the groundbreaking ceremony. Due to its location at the boundary of the NWFP and the Northern Areas, the Bhasha dam suffers from technical, environmental, ethnic, and social issues. These are complicated issues and will require not only the deepest commitment, but also deft handling by the Government. The site of the dam is reported to be faulty and there is disagreement among technical staff as to whether or not the three mountains are stable. The experts feel that at least one of the mountain ranges is porous and that the site will not be able to hold the required amount of water. Besides, the stored water has its own hydraulic forces to contend with. If the height of the dam is increased to 600 feet from the original 300 feet the pounding will have two affects. One, it will submerge the all-weather road and the next road alignment will have to be along the snow line at the very top of the range. Second, dams change environmental factors and the growing climate change is due to manmade activities. No human has the ability to predict the consequences of, and take evasive action to avoid, environmental disasters. Natural disasters have also increased in frequency.

The ethnic and social issues are considerable. The district of Chilas will be under water. Where are these people to be settled? Mountain people do not like to live in the plains and, in any case, they will be out of their cultural context. Uprooting populations is next to impossible and, given the culture of our people, will lead to grave consequences. Furthermore the Chilas district is Sunni and the other districts are Shiite, with the Ismaili Shiites predominant. The development programme launched by the Agha Khan has preferred areas where the Ismailis are predominant. So prejudice is going to play its part and an ethnic conflict cannot be ruled out. Prior to 1987, there was no ethnic conflict and no criminal record in the police stations, but since the development projects have started with a preferential bias the conflict over development has increased, and there is now regular conflict. The gap that was stable between the ethnic groups has now widened. The development gap is fraught with danger as these very communities were living peacefully before the advent of development.

Climate change is going to substantially impact on food security, poverty, and people's livelihoods. ICIMOD has been identifying these issues, but whatever action has been taken was nullified by the organisational and political difficulties that Pakistan has faced. It has had political governments, and it has had military governments. Military governments are supposed to be tough in their attitude, and do perform, but more often than not these tough decisions backfire if they are not based on cogent reasons. So if the snow line keeps receding, the likelihood that Pakistan will

become severely arid cannot be ruled out. Pakistan may well be facing the scenario of a desert country like, say, Somalia.

The impact of this on livelihoods in the plains will be devastating. Steps need to be taken to ameliorate the poverty factor and protect the livelihoods of the people in the area. The tragedy of the dams is that we have been like the prodigal son wasting resources. Pakistan is only 27% efficient in the use of its water resources. The better course would be to improve the use of water. Water efficacy is important. If the Bhasha dam is constructed, the positive side is that the Northern Areas will receive some royalties, which is important as the area has limited funds.

The technologies that ICIMOD can provide could have a far reaching impact. One technology brought to Pakistan by ICIMOD was the seabuckthorn plant, for which appropriate areas were identified, and the benefits of which could have been considerable However, the ICIMOD project focused only on the supply side of the development of the commodity. No one tried to work on the demand side. As the product had medicinal properties, the Ministry of Health was asked to register it as a medicine for the treatment of disease. Evidence of its application to alternative medicine was provided, but it met the fate of all medicines and all confrontations with the multinational corporations. No matter how hard people try, the multinational corporations will not grant the consumer the right to choose. They have 91% of the pharmaceutical market and are heavily entrenched in the entire medicine market – and all the personnel in the Health Ministry and the medical practitioners play along.

What can ICIMOD do to change this? Seabuckthorn has the potential to be a major source of income and improve the livelihoods of people in the arid mountain areas. Seabuckthorn would not only provide economy wide benefits, it would also save on expensive medical bills – generating wealth and improving social welfare. ICIMOD identified the biological aspects and allowed Pakistan access to the crop in China. The study group saw and understood its implications. Support was needed for product development, marketing, and the cost of manufacturing of machinery. It was not much in those days, but ICIMOD felt unable to respond as it was a research organisation. So is ICIMOD not interested in making the intervention successful? This is a shortcoming, not only of ICIMOD, but of the entire Consultative Group on International Agricultural Research (CGIAR) system. The same is true for the excellent biodiversity of the area, especially in relation to medicinal plants. Efforts should be made to develop and market such plants. Artemesia and other herbs, such as cumin and the like, are found in these areas. These should be domesticated and agronomic practices for cultivation developed. In retrospect, all the good work that was done by ICIMOD has been wasted because of the conventional strategy followed. Good work could have gone on to excellence.

Similarly, the breeding of angora rabbits and the development of products from their fur could have been encouraged. I did get some of these ideas across, and ICIMOD did train one lady in this (Nusrat) and she did well, but we Government functionaries fall foul of the powerful hierarchical

organisational hurdles in our own country. When that happens, all the good work that should have continued is dismantled. This is the nature of the political system; it is unwise to seek a rational explanation for this and develop a system based on certainty.

Again, the sloping agricultural land technology (SALT) was well formulated and could have been taken further. Indeed, now that I live in the low mountains north of Islamabad (it is easier to shift from the plains to the mountains than vice versa) I have realised the value of the technology that I initially learnt from ICIMOD. I have a garden of half an acre at an altitude of 2500 feet above sea level. It provides 70% of my vegetables; seasonal fruit such as apples, pears, loquat, mangos (efficiency requires that the mango plant be at shoulder height), bananas, citrus (all kinds); lemon olives, *m. oleifera* for edible oil; jaman, avocado, and some trees such as juniper, and teak – with tropical and temperate trees growing together. In addition, I have a fishpond and meat from home sources. There are innumerable rose bushes, bamboos (seventeen species), and pine trees, not to speak of the rosemary and other herbs that I grow. All these plants are growing together (companion planting) and, as I am short of water and have to make every drop count, these plants are in storey planting. This is a frost area, but I have learned to deal with and drain out the frost. There are novel ways to handle frost.

The lessons that one learns are continuous, and I suggest that ICIMOD takes on an even more imaginative intervention. I have to mention again that if I had not been associated with ICIMOD these interventions would never have been there. Now the world stands on its head and I have taken on another challenge, but I maintain that any bald mountain can be made productive. The Northern Areas, especially, have been my pet regions, they make me feel that the definition of lake has to change. The mountains opposite Bhasha are full of water, but that water is not being utilised. The trees that are growing there are land races, but what stops temperate fruits from growing there? Nothing. So that is the next frontier to cross.

There are any number of opportunities, but the fate of interventions like the growing of eucalyptus trees should be avoided. Eucalyptus have been planted by people unaware of the difficulties that arise when thoughtless interventions are implemented. The shallow root structure of the eucalyptus tree has led to soil erosion. An orientation course for scientists that come to ICIMOD may be necessary so that they understand and are sensitive to the requirements, not only of people, but also of nature and its many facets. Similarly, fruit trees were planted that had fungus, causing a real scare.

The North does not need any chemical fertilisers, because the minerals in the stones slowly release NPK for fertiliser, as well as a host of micro fertilisers. Similarly, bio pesticides are the order of the day and the local land races provide a clue as to the way forward. If the world of the mountain people is forced to change, a new and arrogant nature would be required with no apologies. Poverty anywhere is manmade and due to the selfish polices of the few to the detriment of the welfare of the many. Can ICIMOD make a difference?

Let me not belabour the points too much and suffice it to say the following:

- A demand and marketing strategy should be developed.
- Agriculture conservatism should be put aside and bold interventions taken. Scientific certainty is a myth and if Newton's laws can be challenged why not more ruddy ones?
- Nature farms should be developed in which resource poor farmers are taken to places within their own budgetary resources. I do not consider finances to be essential. Some may be necessary, but it is knowledge that is essential and critical.
- Products rather than commodities should be developed.
- Venture capital should be established for these people for they have a lot of good common sense.
- Encourage people to develop gardens for wellbeing, in which they can grow plants to treat minor ailments at home. Such plants are extremely simple to grow. Give the people a chance to live healthily and well, and to have the pleasure of their own house garden. You could take care of blood pressure, prostate difficulties, coughs and colds, and maybe even have your own shoe polish (I have not purchased shoe polish for over ten years, but instead use a particular fallen flower).
- Provide fertiliser tea for your plants the easy way.
- A weed is a plant whose value you do not know.
- Let apiculture be across the spectrum of interventions. Bees are very egalitarian and manage to rob from the rich to help the poor.

I used to provoke the audience and say that given a free hand, the income of the farmers of the Northern Areas could be more than that of the irrigated areas of the Punjab and the Sind. Life ordained in nature is relaxing and fulfilling. I would like to invite ICIMOD to come and see for itself at my house in Pakistan. ICIMOD has done wonders, but the cognitive ability of each individual has its own limitations. Cognitive dissonance is what ICIMOD has to worry about. Do not let anyone mark time. I wish ICIMOD well, for it can deliver, but that will depend on whether or not there are people at ICIMOD who will simply not get along or get along. The dimensions are such where the limitations are many. I intrinsically believe in the goodness of human nature and its ability to be compassionate. When we are one with ourselves we are at peace with others.

Great was this opportunity to share some thoughts with you. I do believe in ICIMOD and its abilities.

Impacts of Climate Change on Himalayan Water and the Need for Regional Transboundary Cooperation

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The freshwater systems in the Himalayan region are continuously undergoing natural changes in terms of quantity and quality. These changes are accelerated by the increase in human exploitation of water resources caused by increasing population pressure and rising levels of urbanisation and industrialisation. Growing concern for environmental degradation has further increased pressures on water resources. These pressures are intense within national borders and even more intense in the case of transboundary rivers, where two or more countries share the same river basin. There is clear evidence that Himalayan glaciers have been melting at an unprecedented rate in recent decades. This trend is causing major changes to freshwater flow regimes downstream and is likely to have a dramatic impact on drinking water supplies, biodiversity, hydropower, industry, agriculture, and more, with far-reaching implications for the people of the region and for the Earth's environment. The growing competition for the water resources of transboundary rivers and climate change across countries are expected to intensify the potential for acute upheaval and conflict in the region.

Bangladesh lies the farthest downstream of three of the mightiest river basins in the world: the Ganges, the Brahmaputra, and the Meghna. All three river systems originate in the Himalayas outside Bangladesh and terminate in the Bay of Bengal. The three river systems have a drainage area of about 1.75 million square kilometres with an average runoff of around 1200 cu.km, stretching across China (Tibetan Plateau), Bhutan, Nepal, India, and Bangladesh. These three rivers have a combined peak discharge of about 180,000 cumec during the flood season – the second highest in the world after the Amazon – and their waters carry about 2 billion tonnes of sediment each year. About 10% of the world's population (over half a billion) live in the Ganges-Brahmaputra-Meghna basins. The region contains the largest number of the world's poor (about 40% of the total number of poor in the developing world). Nearly half the regional population live below the poverty line, with a per capita income of US$ 400 per year and daily calorie intake of less than 2100. Moreover, the region faces common problems of overpopulation and poverty, floods, droughts, and ecological imbalance. The frequency and severity of flooding of the Ganges-Brahmaputra-Meghna river basins is due to the amount and timing of precipitation, the condition of

* Mr Siddique passed away on 1 September 2008. He was a true friend of ICIMOD and his contribution will be remembered by all of us.

the basin, and upstream controls. One hazard associated with river flooding is riverbank erosion, due to the meandering behaviour of alluvial rivers. Climate change impacts have hindered economic development in the region and food security has been threatened. These impacts will increase further in the future.

According to the United Nations Environment Programme (UNEP), Bangladesh is ranked as the most disaster prone area in the Asia-Pacific. Flooding is a recurrent phenomenon. About 60% of the country is flood prone, and 20% of the land area is inundated during the monsoon season, even in a normal year. Catastrophic floods like those of 1988 and 1998 inundated more than 60% of the country's land area, causing damage to the people and the nation as a whole of about US$10 billion. Throughout its 35-year history, Bangladesh has often found itself living under the threat of monsoon rains, cyclones, river erosion, droughts, and other meteorological hazards associated with a nation situated barely above sea level and having almost the highest population density of any country in South Asia and the world. In the Fourth Assessment Report of the IPCC, Bangladesh is identified as the most vulnerable out of 27 countries to the impacts of global warming induced accelerated sea level rise. The high degree of vulnerability of Bangladesh can be mainly attributed to its extensive low-lying coastal area, high population density, the frequent occurrence of cyclones and storms, high storm surges, and high rate of coastal environmental degradation due to pollution and non-sustainable development. Most of the people residing in the coastal zones are directly dependent on the natural resource base of the coastal ecosystem. A rise in sea level could result in the loss of cultivable land to inundation, salt intrusion into coastal ecosystems and into the groundwater system, and the loss of terrestrial and marine biodiversity. The Sundarbans, which are already experiencing high salinity, will be affected more by saline water intrusion due to increased sea level, both in the dry and monsoon seasons.

The Government of Bangladesh has developed a strong and effective institutional framework at the national and local level for mitigation and preparedness for all disasters including cyclones. In November 1985, the Government of Bangladesh introduced the 'Standing Orders for Cyclones', and, in 1999, the Ministry of Food and Disaster Management issued the revised 'Standing Orders on Disaster'. The Standing Orders are guidelines for different functionaries at the national, divisional, district, upazila, and union levels of government and for non-government agencies in relation to action to be taken at different stages of a disaster. They clearly spell out what is to be done, when, and by whom. The Standing Orders have received praise from the international community for the effective handling of cyclones and other natural disasters in the past. the Government of Bangladesh is currently developing a climate change strategy and action plan.

The Government of Bangladesh approved the National Water Policy in 1999 and the National Water Management Plan (integrated water resources management, NWMP) in 2004. The NWMP is a comprehensive document, covering a period of 25 years from 2000-2025, with a total of 84 programmes. Due to the threat of flood and the uncertainty of water availability during the dry season, Bangladesh can't firmly plan water resources projects. Climate change will pose further

challenges in relation to the planning and design of new water projects. For the long-term planning of water resources projects, regional cooperation on basin-wide water management is very important. The Ganges-Brahmaputra-Meghna basins have tremendous agroclimatic diversity, a highly fertile arable land area of about 79 million hectares, a 2 billion ton silt load, an enormous delta spanning Bangladesh and part of West Bengal in India, some 110,000 MW of identified hydropower potential with additional power generation through pump storage capacity, vast navigable waterways, varied forest resources including the largest mangrove forest in the world, a treasure-house of biodiversity, and an abundance of fish resources. There are already conflicts in these transboundary river basins. Potential water conflicts in the Ganges-Brahmaputra-Meghna basins can only be prevented through a holistic approach to the management of existing water resources covering all aspects of water use. Basin-wide harnessing, development, sharing, and management of the common water resources must be carried out within the wider context of a sustainable water resources management programme. The issues concerned can seldom be contained by administrative or economic boundaries. Efforts to tackle them should be broad-based and multidimensional. In an area like the Ganges-Brahmaputra-Meghna basins, where severe imbalances of water availability exist spatially, and also at different times of the year, it is inevitable that any solution to the problem of one water user, will have an adverse impact on another. The issue then becomes one of minimising the impacts. This needs an integrated approach to water resources management with cross-sectoral integration a pre-requisite.

Owing to the seasonal variability of water volume in the Ganges-Brahmaputra-Meghna river systems, the dry season flows of the rivers, particularly of the Ganges, are inadequate to meet the combined needs of the region. This will be further aggravated by climate change. There is an urgent need to augment the flow of the Ganges to overcome water shortages.

Harnessing of the bounty of water during the monsoon season (the rainy season) is essential to meet dry season water needs. This requires the storage of monsoon water flows within a framework of sustainable development in the region. An institutional mechanism for basin-wide river water management, like the Ganges River Basin Organisation (GRBO), in line with the Mekong River Commission (MRC), is very important.

One possible option for substantial augmentation of the Ganges, which could benefit Nepal, India, and Bangladesh, would be to construct large storage sites on the Ganges tributaries originating in Nepal. Due to the potentially high water holding capacity of reservoir sites in Nepal, there are excellent opportunities to create storage reservoirs. In 1983, on the basis of studies, Bangladesh proposed the construction of seven large storage reservoirs at Chisapani, Kaligandaki-1, Kaligandaki-2, Trisulganga, Seti, Saptokosi, and Pancheswar in Nepal. These reservoirs would augment the dry season flow of the Ganges by 1670 cumecs (built at normal height) or 5385 cumecs (with the storage reservoir at Chisapani, Trisulganga, Seti, and Saptokosi built above normal height). Studies indicate that the construction of the proposed storage reservoirs is technically feasible. Moreover, the storage reservoirs would produce enormous amounts of hydro-

electricity, which would meet the power demands of the region. Another beneficial effect of these storage projects would be significant flood mitigation in the downstream Ganges areas. According to studies carried out by the Institute for Integrated Development Studies in Kathmandu, the terrain of the northern and middle belts of Nepal contains excellent sites for storage reservoirs. These studies identified 28 potential reservoir sites – nine of which are classified as 'large', having a storage capacity of over three billion cubic metres. A highly favourable project from this perspective is the Sapta Koshi High Dam in Nepal, the revived third phase of the original Koshi project. The Koshi Dam will have a significant storage capacity, which should provide both North Bihar (India) and Bangladesh with a flood cushion and augment dry season flows, after meeting Nepal's full irrigation requirements. It will also provide Bangladesh with an increased additional share of water (of around 50,000 cusec) during the dry season.

Regional cooperation in the Ganges-Brahmaputra-Meghna river basins is very important for integrated water resources management in the basins and adaptation to climate change. Ideally, cooperation based on mutual trust and transparency between the riparian countries should ensure the optimal management and sharing of international rivers. An honest broker is needed to facilitate such regional cooperation. In this respect the Abu Dhabi Dialogue initiated by the World Bank is laudable. The World Bank has established a Knowledge Forum under the Abu Dhabi Dialogue facilitated by ICIMOD. The need to share hydro-meteorological data between countries in the region and for collaborative efforts in relation to flood forecasting and warning and research studies on climate change are equally important.

ICIMOD – a mountain learning and knowledge centre – has been working as a facilitator for regional cooperation for flood disaster mitigation in the Hindu Kush-Himalayan region, as well as conducting research on the impacts of climate change on glacier melt and on downstream consequences. It has also facilitated IPCC panel discussions on global climate change. ICIMOD has contributed significantly to facilitating the exchange of information, knowledge, and expertise among its member countries, thereby enhancing understanding and cooperation among them in addressing sustainable development and disaster mitigation issues. The impact of climate change on mountain ecosystems, the pressure on the natural resource base, threats to the conservation of biological diversity, and continuing social unrest and political tensions within the region, along with increasing discrepancies between the rich and poor, high and low status groups, upstream and downstream populations, are some of the key challenges being faced in the region. Water is the key to overcoming all of these challenges. A study carried out jointly by ICIMOD, UNEP, and the Asia-Pacific Network (APN) for Global Change Research between 1999 and 2003 documented about 15,000 glaciers and 9,000 glacial lakes in Bhutan, Nepal, Pakistan, and selected basins of China and India. Such a high concentration of captive water and ice has aptly earned the Himalayan region the name the 'Third Pole'. As discussed above, this mountain range feeds most of the major perennial river systems in the region (Ganges, Brahmaputra, Meghna, and Indus, among others) and is considered the lifeline of approximately 10 per cent of the world's population. Water is the single most important natural resource of the countries that share the Ganges-Brahmaputra-Meghna and will shape the future of millions of people living in the region.

The Creation of ICIMOD and its Expected Role in Addressing Regional Environmental and Developmental Challenges

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As ICIMOD prepares to celebrate its 25th Anniversary in 2008, India, one of its eight regional member countries, set up a Task Force (in May 2008) "for analysing the problems of Hill States and Hill Areas in order to develop a proposal for development of the region". This Task Force constituted by India's Planning Commission has been given a set of six terms of reference to capture and identify the "issues, concerns and problems of hill states and hill areas". The author of this article received an invitation to contribute his suggestions and comments, from the "partner institution of ICIMOD in India", for incorporation in a document purported to be a "broad outline of the draft base paper" for consideration of the aforesaid Task Force.[2]

These two parallel events – the celebration of ICIMOD's Silver Jubilee and the setting up of a Task Force by India to analyse the problems of hill states and hill areas – provoke the questions: Has ICIMOD rendered itself irrelevant to the HKH region? If not, what role is ICIMOD is likely to play in the making and shaping of this Task Force report? Is the Task Force and its report likely to have any significance for ICIMOD, both with regard to ICIMOD's Strategic Framework with regard to its Medium Term Action Plan 2008-12? Is there any coherence between the planning processes of the Indian mountain states and ICIMOD, say for the next five years? Finally, more specifically, does ICIMOD involve itself in similar and related undertakings with, or in, any of its other RMCs, and, if not, why not?

The queries above could as well be asked by any one of the eight regional member countries (RMCs) of this august institution, and the replies that might be offered in each case are arguably going to be specific to the RMC concerned, so geo-politically diverse is the turf that ICIMOD traverses. Even so, in securing answers to one RMC-specific situation, one might hope to see some

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[2] Letter of Dr LMS Palni to the author on 'Development of a Base Paper on Issues, Concerns and Problems of Hill States and Hill Areas' for the Task Force of Planning Commission, dated 26 May 2008.

light at the end of the tunnel. In this short essay, through a time-line comparison of the various planning processes that have already been completed by ICIMOD and India for its mountain states, an attempt is made to analyse and assess the extent to which it is really possible for ICIMOD to address 'regional' (read Indian) expectations in the realms of environmental and developmental challenges.

India, Indian Mountains and ICIMOD

More synchronised planning is needed.

Taking ICIMOD first, at the macro-level, following the Fourth Quinquennial Review (QQR), the new strategic framework 'Responding to the Challenges of Global Change: Enhancing Resilience and Supporting Adaptation of Mountain Communities' is now in place. The Framework focuses on three strategic programmes: (i) Environmental Change and Ecosystem Services (ECES); (ii) Integrated Water and Hazard Management (IWHM); and (iii) Sustainable Livelihoods and Poverty Reduction (SLPR); supported by a cross-cutting Integrated Knowledge Management approach. The Framework and these Strategic Programmes set ICIMOD's course for the next five years.

The Strategy enlists five strategic goals, which envisage (i) RMCs mainstreaming "ICIMOD's knowledge and technical expertise and their wide use" in their water, ecosystem services, and poverty reduction programmes; (ii) value addition and impacting through "close collaboration with the national partners through long-term regional research" and "scaling up of programmes"; (iii) regional and global utilisation of "ICIMOD's transboundary approach, experience, practices and know-how"; (iv) "benefiting RMC partners through (their) capacity building and knowledge sharing" with what "ICIMOD is (itself) proactively learning and gaining in terms of knowledge and good practices (from whichever source, including the RMCs themselves); and (v) establishment of a "vibrant knowledge management and information sharing network" resulting from ICIMOD's "support in strengthening key RMC institutions to better address water, ecosystem services, and livelihood related issues in the region".

Broken down into strategic outputs, the consolidated MTAP II is guided by the Strategic Framework and is based on the directives of the Board of Governors and the ICIMOD Support Group, and the recommendations of the Fourth QQR (2006). The draft plan has been discussed in national and regional consultations held in all eight ICIMOD member countries, as well as in regional consultations organised at ICIMOD. Among the key recommendations made during the consultations, ICIMOD was expected to (i) scale up its pilot projects; (ii) develop partnerships with centres of excellence; (iii) closely engage with national strategic partners from the planning phase onwards to avoid duplication; (iv) address climate change related impacts, especially expected water shortages and the degradation of environment services; and (v) focus on high value products, their marketing and value addition, and influence value chains. At the end of it all, the MTAP II boils down to "13 strategic outputs and indicators to assess results at the end of five years" (ICIMOD

2007a, 2008). Planning for the next five years was broadly approved by the Programme Advisory Committee plus two special invitees (PAC+) in its 9-12 June 2007 meeting, during which it was suggested that there be "some reworking of the poverty thrust, given its critical importance to the RMCs" and a focus "on meeting the expectations and priorities of the RMCs and international donors" (ICIMOD 2007b).

The Indian Scenario

The Eleventh Five Year Plan of India (hereafter the Eleventh Plan) 2007-12, (with an outlay 120% higher than the Tenth Plan, at INR 3,644,718 crore; US$ 1= INR 39.25 in Dec. 2005) was approved by the National Development Council on 19 December 2007. ICIMOD's and India's five-year plans both end in 2012, in December and March, respectively. The Indian Plan addresses itself to the challenge of making growth both "faster and more inclusive", and its vision and strategy has been summarised in just two words 'inclusive growth' (GoI 2008a). ICIMOD's Strategic Framework and Medium Term Action Plan II, with its "13 strategic outputs and output indicators to assess results", seem to have no direct bearing on either the Indian development vision and strategy (inclusive growth), or its "27 national or 13 sub-national monitorable targets". Why this disconnect, and how does it impact on rendering ICIMOD and its strategic programmes irrelevant to the mountain regions of India? The preceding analysis has shown that the time-sequencing of ICIMOD's MTAP planning has not factored in the Indian planning timeframe. There is also no evidence in the ICIMOD literature to suggest that it has taken notice of any of its other RMC's timeframes and priorities in relation to their planning processes. How could ICIMOD plan in isolation for the HKH region without taking into account any of the priorities reflected in the planning documents of its constituent RMCs, irrespective of the planning process followed by the individual RMCs? This, in my view, is the basic reason for the 'disconnect', that has been alluded to. It follows that ICIMOD continues to remain more, if not exclusively, sensitive to the planning timeframes and processes of its support-group and donors.

'Misplaced' or 'Missing' Nodality?

Next to this major lacuna is the issue of selecting the right anchor or nodal agency for ICIMOD in its constituent RMCs, an issue which hitherto has not been given any serious thought at all. Out of the eight RMCs, except for the Peoples' Republic of China, the nodality of ICIMOD is anchored in one Ministry or the other, i.e., directly with the Government. The point to ponder, both for ICIMOD and the RMCs, is whether the present nodality is appropriate or is there a need for a change in view of the Strategic Framework of ICIMOD and vis-a-vis the strategy of the RMC concerned? The choice of focus is clearly between 'environment' and 'development' as subjects/themes. For the RMCs, it is not very relevant if it is ministry 'X' or ministry 'Y' that anchors ICIMOD, but for ICIMOD, clearly it makes a world of difference when it comes to the impact of its interventions in the host RMC. ICIMOD's Board of Governors needs immediately to give this issue the serious thought that it deserves. Providing 'the best fit' anchor for ICIMOD in all its RMCs is the best gift the Board of

Governors could give to ICIMOD on its 25th Anniversary, as it is entirely up to them, individually and collectively!

ICIMOD's interventions are clearly going to be directed at the Indian mountain states. Where do we find them in the Indian scheme of things? The Indian plan document admits that India has "learnt how to bring about growth, but we have yet to achieve comparable success in inclusiveness. Poverty, whether we look at it narrowly in terms of the population below the consumption-based poverty line or more broadly in terms of population without access to essential services…our people have a right to expect that the evidently increased economic capabilities of our economy are translated into accelerating progress in these dimensions also." The above demarcates the band-width of 'development' insofar as Indian development interventions and planned resources for the realisation of development goals are concerned.

The Eleventh Plan is geared to build on the achievements of the Tenth Plan, which was a period of "extensive review of environmental processes and law", by integrating "environmental considerations into policy making in all sectors of the economy – infrastructure, transport, water supply, sanitation, industry, agriculture, and anti-poverty programmes". Initiatives short-listed by the Indian planners to integrate environmental concerns into planning and development activities include (i) "making environment a concurrent subject in the Indian Constitution (presently it is a residual subject), since regulation and enforcement in this area cannot be handled by the Central Government alone and the responsibility of maintaining the environment rests at all levels of government"; (ii) "setting up an independent statutory body on sustainable development with the specific responsibility of guiding government policies and programmes for making them more socially and environmentally sustainable, and to monitor and evaluate their outcomes"; (iii) "restructuring of State Pollution Control Boards into statutory Environment Protection Authorities with the mandate of developing regulations, standards and upgraded facilities for enforcing compliance" and such similar issues.

Has ICIMOD's strategic programme ECES taken note of these requirements of India and could these be covered by the strategic outputs and indicators listed for ECES in the MTAP II? If the answer to some of these questions is affirmative, then ICIMOD is certainly 'in business' (Government of India 2008b). It is only through proactively serving such identified demands of the RMCs that ICIMOD can demonstrate that it is now ready to do ground breaking work. Besides a considerable amount of ground breaking work, an equally sizeable number of door-opening assignments appear overdue, a legacy of 'misplaced' anchoring of ICIMOD within RMCs. No wonder the last QQR panel found itself repeatedly having to open doors on behalf of ICIMOD! These are the tests that the new Framework is now required to pass, and these are the themes for which ICIMOD must bring on board its strategic and cooperation partners in India.

Given the bandwidths of 'development' and 'environment and climate change', one wonders if ICIMOD's present nodality anchored in the Ministry of Environment and Forests is appropriate, as

the major thrust of the Indian Plan is going to be 'inclusive growth' and not the environment? Is this simply a case of 'misplaced' nodality or that of a 'missing' one, in so far as its mountain states are concerned? This is the third major issue that needs to be examined at this important juncture.

Bridging Regional Imbalances

The objective of India's Eleventh Plan, as stated, is "faster and more inclusive growth", and each of the 13 chapters in the Eleventh Plan deals with what the Plan proposes to do to achieve this dual objective. The Plan acknowledges "widening income differentials between more developed and relatively poorer States" as a matter of serious concern. In this segment of the Plan, the 11 Indian mountain states (all Special Category States) are compared, both against each other and against the other 17 Non-Special Category States, in terms of progress in growth rates measured by State Domestic Product over the term of the past three Plans. The Plan seeks to target the slower growing States, and the backward areas within these States, for higher levels of public investment to enable discrepancies in physical and social infrastructure to be addressed.

From the point of view of the Indian mountain states, the second segment, related to the North Eastern Region (NER) of the country which is an area of low per capita income and major growth requirements, holds greater significance. The NER offers itself as an excellent case study for ICIMOD. Besides recognising the eight North Eastern States as Special Category States, a slew of measures have been taken for their development covering (i) policy changes as "new initiatives for the North Eastern Region" (e.g., "earmarking 10% of the Plan budgets of the central ministries/ departments for development of NER"); (ii) "Non-Lapsable Central Pool of Resources (NLPCR)"; (iii) "setting up of Ministry of Development for North Eastern Region" in 2001 "to coordinate and give impetus to the Centre's development efforts"; (iv) "transfer of NLCPR to the Ministry of Development of North Eastern Region (DoNER) from the Planning Commission"; and (v) "establishment of a North Eastern Council to act as an advisory body in respect of socio-economic development and balanced development of the eight states", among other measures (Government of India 2008c).

Ministry of Mountain Development

Just as in the NER, the mountain states "though rich in development potential in terms of human capital and natural resources, lack adequate physical infrastructure" impeding their growth. In other mountain states of India also "the primary sector has remained largely stagnant, the secondary has been handicapped due to a variety of reasons" and "the planning exercise has resulted mainly in the expansion of the tertiary sector". Is this not the universal experience all over the HKH? If so, then the NER case study needs to be taken up by ICIMOD and ICIMOD ought to assess for itself the extent to which its three strategic programmes and 13 strategic outputs and indicators are relevant to the eight NER mountain states. The degree of coherence between its 13 strategic outputs and the priorities of the NER is a clear indicator of ICIMOD's relevance to the NER mountain states of India.

Given its unique role in the overall development of as many as eight mountain states out of a total of 11, the Ministry of DoNER appears to be a more appropriate host/anchor for ICIMOD in place of the MoEF, as the latter seems less qualified to mainstream 'inclusive growth' in the backward mountain states of India. The Ministry of Development of North Eastern Region could be upgraded to a Ministry of Mountain Development by simply adding the three remaining Indian mountain states of Uttarakhand, Himachal Pradesh, and Jammu and Kashmir, without incurring any additional expenditure, as these remaining states are also 'Special Category States' and, like the NER states, enjoy the benefit of the 'special industrial incentive package'. The policy changes that have been tried and tested successfully in the NER mountain states could be selectively and gradually applied to the remaining three mountain states, and, in turn, the NER states could also benefit from the experiences and best practices of the other states.

This, incidentally, is one of the major recommendations of the Task Force on the Mountain Eco-systems for the Environment and Forest Sector, constituted by the Planning Commission for the Eleventh Five Year Plan. In addition to establishing a Ministry of Mountain Development, this Task Force suggested (i) "mainstreaming of FRDC types of administrative structures"; (ii) "back-stopping of Ministry of Mountain Development by R&D institutions located in the Indian Himalayan Region (IHR) region"; (iii) "following Indian Council of Agricultural Research (ICAR) Regional Committee system for identifying R&D issues of States"; and (iv) "effective addressing of mountain poverty", among other things (Government of India 2006). These recommendations deserve examination by, and the support of, ICIMOD.

With the global importance of mountains being increasingly recognised, a study of the mountain areas of the 15 countries of the European Union (EU), the 10 acceding countries, and the 2 accession countries of Norway and Switzerland has also arrived at the same conclusion: that there exists an urgent need "to recognise the great diversity that characterises these areas, at all scales. Natural, economic, and social handicaps exist, but not everywhere or to the same extent." The study points out that "in the context of globalisation, mountain areas face three contradicting challenges: to turn into 'open museums'or areas for recreation and protected nature for industrialised societies; to be regarded as regions to be economically exploited; or even to be over-exploited; and abandoned."

This study, while recognising "the European dimension of mountain regions and expectations from mountain actors", found "the need for an EU policy specifically directed to the mountain areas and distinct from other structural policies…not unequivocal". The study observes that structural problems could generally be addressed through the classical objectives of regional policies and through the programming approach of the Structural Funds. Its most important conclusion is that "co-ordinated mountain policies would involve a large number of different sectors, and therefore remain a national responsibility. Any future EU mountain policy must respect the principle of subsidiarity. Given the great variety in national approaches to mountain issues, there will be much to gain from international comparative studies of the implementation of policies and measures and systematic

dissemination of experiences between regions and countries" (EU 2004). ICIMOD would do well to share the diverse set of experiences in the implementation of policies and measures of its constituent RMCs, in the first instance by securing better insights into them, which would only be possible through an appropriate nodality/anchor in each RMC, and not through sectoral Ministries, as is the case at present.

Such a gigantic task is obviously beyond a single ministry responsible for one sector, as is the case in India with the MoEF. The task should be entrusted to a ministry that can effectively coordinate the functioning of a large number of different sectors in the spirit of 'national responsibility'. This underscores the necessity for a Ministry of Mountain Development to effectively coordinate the work of the various sectors and the Indian mountain states. Such a Ministry would obviously be the nodal Ministry for ICIMOD, for various institutions handling sectoral policies having a bearing on mountain regions, and for all the Indian mountain states. The development of mountains has to be a national responsibility, as the European study has clearly emphasised. The sooner that this is realised, the better it will be for a country like India with such a large mountainous area. The sectoral approach to mountain development must be abandoned immediately and an integrated approach embraced.

RMC 'Immersion' of ICIMOD

The Fourth QQR emphasised 'regional ownership'. The Programme Advisory Committee plus (PAC+), while supporting ICIMOD's new Strategic Framework, again emphasised that it should give ICIMOD "a strategic chance to do groundbreaking work" in a number of areas and, in particular, "to focus on meeting the expectations and priorities of the RMCs". Therefore, the following are suggested:

- Along the lines of what has been undertaken briefly with reference to one of the RMCs (India) above, a similar exercise could be commenced quickly with regard to the medium-term plans of the remaining seven RMCs (as most of them undertake central planning exercises similar to that undertaken by India). What would emerge, is likely to be not only more 'RMC-needed' but also 'RMC-supported and financed', enabling ICIMOD to take its first steps towards becoming 'RMC-owned' in real terms.
- The outcomes of this exercise should be harmonised with ICIMOD's 13 strategic outputs and output indicators in MTAP II, abandoning those that do not pass muster on this 'RMC-test' as it were.
- ICIMOD should closely examine the present nodal institution in each RMC and negotiate the anchoring of ICIMOD in an institution/set-up that addresses the largest number of development indicators in the RMC strategy for the mountain regions of that country in the medium term. Having an appropriate nodality for ICIMOD in the RMCs is far more valuable than the monetary contributions that the RMCs make individually or collectively.

This exercise would address some of the key Issues raised by the last QQR Panel such as "understanding of priorities and policies of RMCs", "a regional approach in contrast to a one-to-one interaction", "non-harnessing of RMC funds", "long term financial sustainability", and "weak regional ownership". Here, it would be worth recalling the concluding remarks of the Fourth QQR Panel:

> "Continuing and improving on the existing strengths will not be sufficient for ICIMOD's future development. The need to change is recommended not just for the sake of sustainability but because it is rather considered a question of institutional survival. ICIMOD has to become more meaningful otherwise the donors will discontinue funding and the RMCs will not adopt the institution" (ICIMOD 2006).

In Conclusion: Back to GBPHIED

As the task of developing a draft of the base paper on 'Issues, Concerns and Problems of Hill States and Hill Areas' has been entrusted to the G.B. Pant Institute of Himalayan Environment & Development (GBPHIED), which is presently the nodal institution for ICIMOD in India, it is naturally expected that this base paper would not only substantially reflect what ICIMOD has on offer for the Indian mountain states on its 25th Anniversary, but also serve as 'documentary evidence' of the fact that ICIMOD has finally come of age and is today recognised by the Indian Planning Commission and the Indian mountain states as a unique regional intergovernmental organisation dedicated to the "improvement of the environmental conditions of the HKH region and livelihoods of poor mountain people". It is only through the evidence of such official RMC documents that the credibility of ICIMOD's claims of 'impacting' and 'scaling up' can be validated and become acceptable to its various stakeholders, especially those who are destined to inhabit the HKH mountains.

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Linking Mountain Communities and Ecosystem Services: Options for Sustainable Livelihoods

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Introduction

At the beginning of the 21st Century, humanity faces two daunting challenges. One is to meet the ever-increasing threat posed by a changing climate, and the other is to lift an estimated three billion people out of poverty. Both these challenges are magnified for mountain regions. First, it has been predicted that the impacts of climate change will be felt at a much greater scale in Asia and Sub-Saharan Africa. Confirming this, the Himalayan region has experienced much greater warming rates than the global average of 0.74°C during the last 100 years (Eriksson and Jianchu 2008). This leaves little doubt that the impacts of climate change will manifest more seriously in mountain regions. Second, more than half the world's population that live in poverty are found in Asia. A significant proportion of this population lives in mountain regions. These populations will bear the brunt of the negative effects of climate change.

Globally, mountains occupy more than 20% of the Earth's land surface and provide more than 80% of our freshwater (The Mountain Institute 2006). Mountain regions also account for some of the most diverse ecosystems. However, by any account, mountain communities are some of the world's most deprived. Mostly rural, and subsisting on small-scale farming, these communities are heavily dependent on natural resources and, therefore, at greater risk from the effects of climate change and degrading ecosystems.

The Hindu Kush-Himalayan (HKH) region is home to an estimated 200 million people. A significant portion of these people live in poverty, and their dependence on an increasingly fragile and vulnerable resource base highlights the need for renewed efforts to conserve these fragile ecosystems and build resilient mountain communities. We have to acknowledge that these communities have been the stewards of our mountains and have thereby ensured the sustained flow of ecosystem services.

Models and institutional mechanisms that can benefit such communities through the receipt of payments for stewardship of environmental services must be tested and promoted. This paper is

written on the premise that good environmental stewardship should be promoted and encouraged. Recognising the opportunity costs borne by mountain communities, it is asserted that compensation should be made for such stewardship. Furthermore, it is believed that such compensation has the potential to engender resilient communities, which will ultimately lead to sustainable livelihoods. To this end, it is purported that there is value in adapting useful lessons learned in other parts of the globe for use in our region.

This paper is primarily drawn from personal experiences in the region in general, and our own country, Bhutan, in particular. Where relevant, we refer to experiences from other regions and countries. Having had the opportunity to visit a number of mountainous areas in ICIMOD's eight member countries, and the rare opportunity to interact closely with local communities, I feel that most of the issues covered in this paper are relevant across the HKH region. Bhutan is a fully mountainous country and its approach to managing natural resources and promoting sustainable livelihood options for its people would be applicable to other mountainous states and provinces in the region. It is my intention to present an honest account of what can be done given the limitations of geographic fragility and political instability that permeate the region, as opposed to what could be done under ideal circumstances. Note, however, that this paper is in no way to be treated as an academic manuscript.

Mountain Ecosystem Services

Water for life

That mountain landscapes are reservoirs and provide water for drinking, irrigation, and many of mankind's other industries is often overlooked. Globally, it is estimated that more than 80% of freshwater comes from mountains (The Mountain Institute 2006). Within the HKH region, the mountains and the rivers they sustain provide the livelihoods for an estimated 200 million people. More importantly, the basins of these rivers provide water for almost a fifth of the world's population, about 1.3 billion people.

Changes associated with climate change will impact on these rivers and their basins, affecting the people who depend on these rivers, and their livelihoods. Growing evidence points to changes in the pattern of river flow volumes. For the HKH region, high-level discharges used to last from April to September. Now, more intense runoff is being experienced for shorter periods in April and May (Eriksson and Jianchu 2008).

The implications of such a change and the kind of negative impact it will have on almost 1.3 billion people are unfathomable. What was so generously provided for and regulated by our mountain landscapes is under threat. At a regional level, proper management of watersheds will help buffer such impacts. However, global climate change needs concerted action at a global level.

Water for energy

Run-of-the-river hydropower plants have become the economic mainstay of many developing mountain nations. More than anywhere else, Bhutan's economy relies on hydropower. It is estimated that there is a potential for 21,000 MW of hydropower generation in Bhutan (Quader 2004). Current estimates put the GDP generated by hydropower at 14%, with revenue earnings from the sector totalling Nu. 4595.5 million (NSB 2007). By 2020, this is expected to reach Nu. 20 billion per annum. At an exchange rate of Nu. 42 to US$1, this would generate US$ 5 billion for Bhutan per annum.

While the revenue generated is substantial, the investment required is also huge. Given this, the Royal Government recognises the need to conserve watersheds to increase the viability of such hydropower schemes.

The changing water flow regimes described earlier also carry a warning for hydropower plants. Increased sedimentation loads and variable and unpredictable water flow regimes mean higher vulnerability for the power plants. These factors could also lower the potential lifespan and power generating capacity of such plants.

Carbon sinks

It is becoming increasingly clear that forests are important carbon sinks. Loss of forests has been linked to increased carbon loads in the atmosphere. Agreed estimates pitch the contribution of deforestation to climate change at about 19%. This is greater than the contribution of the entire global transport sector (www.panda.org). Across the globe, deforestation is a continuing challenge. Within the HKH region, in some countries, poverty and other associated factors have led to massive loss of forest areas.

In Bhutan, with an estimated 64% under tree cover and an additional 4% under vegetative cover, we have been quite fortunate. Enlightened leadership, strong legislation, and effective implementation have resulted in this. All forest areas are managed under the stringent and binding Forest Management Code of Bhutan. Legal instruments ensure that it is abided by. Additionally, about 48% of our country is under a network of protected areas. This is perhaps the highest for any country.

Biodiversity

Mountain ecosystems harbour some of the most charismatic species on the planet and are known for exceptionally high levels of biological diversity. The eastern Himalayas are considered to be one of the 10 biodiversity hotspots in the world. In addition to its intrinsic value, biological diversity holds great value for bio-prospectors. Often unmentioned is the fact that it is the tapestry which holds ecosystems together.

Recreation

Mountains have the ability to inspire. The sheer majesty, strength, and mystery of mountains is a call to the human soul. In this sense, mountains have a special relationship to that part of human nature that seeks for adventure, wellness, and spirituality. It is, therefore, not surprising that an estimated 2 billion people consider mountains sacred (The Mountain Institute 2006).

The global market related to tourism was estimated at US$856 billion in 2007 (www.unwto.org). The market share of nature-based tourism is on the increase. The HKH region is home to some of the highest mountains on this planet. In addition to many unique floral and faunal species, these mountains are also home to some of the most endangered cultures on our planet, and, as such, hold immense potential for tourism.

Options for Sustainable Livelihoods through Payment for Ecosystem Services

The links between mountain resources and sustainable livelihoods are intricate and tightly knit. As already mentioned, almost 1.3 billion people rely in some way on the mountain resources in the HKH region. In Bhutan, an estimated 78% of the population are rural dwellers and depend extensively on mountain resources to sustain their livelihoods.

Water for energy: Harnessing the bounty of the world's tallest water towers

Hydropower is considered one of the most environmentally friendly forms of energy. Given the rugged landscape and steep altitudinal gradients, many rivers in the HKH region hold the potential to generate substantial amounts of clean energy. Bhutan has been trying to tap its hydroelectric potential through bilateral collaboration with the neighbouring country India for mutual benefit. Several joint initiatives have taken place to generate hydropower. The Government's 2006 Revenue Report reflects that in 2006 the Chukha Hydroelectricity Plant earned Nu. 2093 million. In Bhutan, an estimated 6500 MW will be generated by the year 2020. Most of this will be exported to India, generating substantial revenue (estimated at US$5 billion/annum by 2020).

In the face of increasing risks due to global warming, the need to ensure the viability of such hydropower schemes is recognised as a concern. At the national level, this is being enforced through the mandatory protection of forest catchments areas and the huge network of protected areas. Within all such protected areas, resource use is limited to selected felling of timber for personal use with minimal extraction of non-timber forest products. No commercial harvesting of timber is allowed.

Even in forests outside protected areas, clear felling is not allowed. This very strong focus on the conservation of forests entails an opportunity cost for our people, who are not allowed to exact economic benefits through the utilisation of forests.

In Bhutan, the Government has recognised that communities are foregoing short-term benefits. In an effort to address and compensate for such opportunity costs, the Government has recently decided to plough back 1% of the revenue generated from hydropower projects into the Department of Forests. At current estimates, this fund amounts to Nu. 5 million/annum (equivalent to US$120,000/annum). These funds will be used to manage critical watersheds and to improve the livelihoods of communities within watershed areas.

Another option would be to use this money to increase the endowment of the Bhutan Trust Fund for Environmental Conservation. This trust fund, which was set up with the help of the Global Environmental Facility (GEF) and WWF, is financing most conservation works in Bhutan.

Water for drinking and household use

Given the dependence of almost 1.3 billion people on mountains within the HKH region for their water needs, it is crucial that good upstream habitat management be accorded priority. To ensure habitat integrity, it is essential that upstream communities be adequately rewarded for the stewardship of important habitats. Inspiration can be drawn from the experience of Columbia where downstream communities volunteered to compensate upstream communities for habitat protection to ensure proper drinking water (Forest Trends/ the Katoomba Group/ UNEP 2008).

Figure 1: **Tala dam, constructed as a joint initiative between India and Bhutan** *(Karma Dupchu)*

Water for agriculture and industry

Agriculture is the mainstay of a significant proportion of people within the HKH region. A significant proportion of all agriculture within the HKH is irrigated by the rivers. With an ever growing economy, especially in China and India, there is a growing need for water for manufacturing and other industries.

The growing economies of the HKH countries will stretch the capacity of our water resources. Upstream habitat management will be crucial to ensure the continuing adequate supply of water. Finding and establishing mechanisms to compensate communities and institutions responsible for habitat management will be crucial to sustain such stewardship.

Forests as carbon sinks

The global carbon market stands at an estimated US$64 billion (Hamilton et al. 2008). Areas under sustainable forest management and protected areas are substantial within the HKH region. Policies favouring such sustainable use of resources should be encouraged. In addition to state managed forest resources, most countries within the HKH region are increasingly promoting community managed forests. However, deforestation still remains a major concern in some of the countries in the region.

In Bhutan, we intend to establish a community forest for every village over the next five years. As of now, we have already registered 91 community forests with an average size of about 120 ha. An estimated 10% of all such forests are degraded and need to be planted. Such areas where replanting will be carried out can be traded on the international carbon market.

International markets and institutions should be encouraged and coaxed into contributing substantially to reward and promote the conservation and sustainable utilisation of forest resources within mountain regions. Recently, it is encouraging to note, the Government of Norway committed itself to providing US$100 million over the next five years to Tanzania to reduce deforestation and thereby offset carbon emissions (www.katoombagroup.org).

Income from the sustainable utilisation of forests

Sustainably managed forests will benefit mountain communities immensely, not only by meeting timber and non-timber needs, but also by increasing incomes through the sale of carbon and other environmental services. In Bhutan, we currently operate 16 large forest management units and 5 smaller ones, covering a total area of 156,578 ha. We are proposing to pump back a portion of the revenue from such areas to communities in the units as a reward for protecting the environment.

As mentioned earlier, we intend to establish a community forest for each village within the next five years. These communities will earn additional income from the sale of produce and services from sustainably managed forests. Where communities forego the right to harvest produce, mechanisms will be sought to compensate them for their stewardship.

Such models that ensure direct benefits to mountain communities should be promoted and vigorously pursued within the HKH region.

Banking on biodiversity: Sustainable and alternative ways of utilisation

The HKH region is one of the most biologically diverse on the planet. Within the Himalayas itself, it has been estimated that more than 700 plants have medicinal value. Carried out under an effective framework of legislation and institutions, the proper harvesting and marketing of such plants has immense potential to benefit mountain communities.

One such plant is the cordyceps (*Cordyceps sinensis*). This grows almost throughout the Himalayas. In Bhutan this year (2008), the total revenue earned by farmers amounted to Nu. 96 million (US$2.3 million). This huge influx of revenue is changing our communities in profound ways. The challenge is to convince local communities to invest such increase in income in sustainable projects.

Another valuable resource is mushrooms. Our mountains are home to a diverse array of mushrooms. Amongst them matsutake, which is the most highly priced, is found in most regions in the HKH.

Like elsewhere, even in Bhutan, we are already facing problems associated with decreasing harvests and degraded habitats. In addition to promoting sustainable harvests, one way of supplementing incomes is through tourism. This year, we launched the first ever Matsutake Festival in Bhutan. This was held with the aim of 1) making people understand how precious resources such as the matsutake are, and thereby making them aware of the need to adopt sustainable harvesting methods; and 2) to supplement the incomes of rural communities who have firsthand knowledge about such mushrooms and their habitats.

In the face of continuing challenges associated with the need to simultaneously raise incomes and conserve habitats, such innovative models of resource management will have to be increasingly tested and adopted. Local knowledge and local institutions should be strengthened and empowered to implement such programmes.

Tourism

The total global tourism market is valued at US$856 billion. This is significant. Given the uniqueness of the HKH region in terms of both nature and culture, tourism offers great potential to generate extra revenue for our local communities. Under a scenario where incomes are raised

through such tourism schemes, local communities will become keener to conserve forests and mountain ecosystems.

Home to some of the highest mountains, most rugged rivers, and highest trekking routes on Earth, tourism within the HKH offers tremendous potential to uplift the livelihoods of local people. However, lessons from the past have shown that mass tourism does not necessarily benefit rural communities. Instead, most of the time, the negative impacts associated with such an industry leave us poorer spiritually and culturally. This reminds us again of the need for effective policies and monitoring tools.

However, in an increasingly globalising world, where places and cultures – including biodiversity – are getting more and more homogenised, the HKH stands as a unique cultural and spiritual icon. This uniqueness must be tapped. Better marketing, institutional arrangements, and policies should aim to ensure that the benefits from tourism significantly improve the livelihoods of mountain communities who are the true guardians of our sacred heritage.

Payment for ecosystem services

At the moment, there are hardly any examples of payments for ecosystem services within the HKH region. So far, we have taken the bounties and services provided by our fragile mountain ecosystems for granted. And, so far, we have not had to face any serious implications. However, under a rapidly warming climate, the need to buffer the impacts of climate change by the proper management of ecosystems at the local level and by committing the global community to tackle this issue is urgent.

There is a need to seek a global consensus and initiate concerted global action against global warming and other threats to ecosystem services. At the regional and local level, the proper management of ecosystems is crucial. To ensure this, payment to communities for the proper stewardship of our ecosystems should increasingly be one of the bases upon which options for sustainable livelihoods are discussed.

ICIMOD's role

So far, ICIMOD's contribution to the HKH region has been substantial in terms of generating information and serving as a knowledge bank. It has been successful in bringing the mountain agenda to the forefront. Additionally, it has been able to effectively leverage governments on issues of common concern.

In light of the two present challenges of climate change and poverty, ICIMOD needs to build and recommend strategies based on shared experiences. Given that payments for environmental

services have been shown to benefit and contribute towards better stewardship of ecosystems, models for implementing this should be piloted. However, the contribution of such schemes to reducing poverty levels and building resilient communities remains dubious. Cross country research and knowledge generation on this theme should be given priority.

International donor contributions should be sourced for this important endeavour. ICIMOD should use its unique position to influence member country governments to proactively support this effort. Lessons learned through research and pilot implementation programmes should be translated into policy options for governments to follow up on.

Conclusions

In a fast changing and evermore industrialised world, it is easy to forget that humanity's future depends on the ability of our ecosystems to provide their services. These services, which range from helping to regulate the climate to purifying our air and providing us with clean water, are diminishing at an alarming rate. Conservation of this natural capital (Turner and Daily 2008) is critical for ensuring sustainable livelihoods.

Across the globe, issues such as the need to maintain current levels of ecosystem services, which lie at the very heart of humanity's ability to survive and thrive, are often forgotten. Most times, other pressing concerns such as war and terrorism take centre stage. However, the roots of most conflict can be traced back to diminishing natural capital, which leads to a reduction in the resilience of communities to provide for basic needs such as food, water, energy, and shelter.

In our region of the HKH, while we are united by geography and thereby face common problems and issues, the political landscape is strikingly different across countries. Terrorism and political instability in some countries threaten our ability to thrive and prosper. To this end, we must find a new consensus in our political ideology. New leaders with vision must forge a stronger path with the common good at the forefront. At a time when the world has to rise up against threats related to global warming and widespread poverty, there is no time to lose. Paying for environmental stewardship and building sustainable livelihoods is a small, yet significant, step towards building a better world and a better future.

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