# Report of the Symposium
# On "Coldwater Fishes of the Trans-Himalayan Region"

**10-13 July 2001**

**Kathmandu, Nepal**

## Acronyms and Abbreviations

| | |
|---|---|
| BIWMP | Bagmati Integrated Watershed Management Programme (HMG/CEC Project # ALA/96/17 |
| DOFD | Directorate of Fisheries Development |
| CEC | Community European Commission |
| FAO | Food and Agriculture Organization of the United Nations |
| FDC | Fisheries Development Centre |
| FRC | Fisheries Research Centre |
| FRD | Fisheries Research Division |
| HARP | Hiil Agriculture Research Project |
| HMG | His Majesty's Government |
| ICIMOD | International Centre for Integrated Mountain Development |
| IUCN | The Conservation Union |
| KGEMU | Kali Gandaki Environmental Motoring Unit |
| MRC | Mekong River Commission |
| NACA | Network of Aquaculture Centres in Asia-Pacific |
| NARC | Nepal Agriculture Research Council |
| NEFIS | Nepal Fisheries Society |
| NGO | Non Governmental Organisation |
| RONAST | Royal Nepal Academic for Science and Technology |
| SAARC | South Asian Association for Regional Co-operation |
| TU | Tribhuwan University |
| UN | United Nations |
| WWF | World Wildlife Fund |

## Content

## 1. Summary

The Symposium on Coldwater fishes of the Trans-Himalayan Region (*the Kathmandu Symposium on Coldwater fishes*) was held on 10-13 July 2001, in Kathmandu Nepal for the purpose of developing a strategy for over all development of coldwater fishes in the region. It was in tandem with the Bangkok conference on Aquaculture in the 3rd millennium. It was attended by 70 participants representing all stakeholder groups in fisheries conservation and development. Participants came from 10 countries of the Trans-Himalayan Region and neighbors including several national, regional and international organisations. Eight-country status papers three resource paper and 21 research papers were presented in the Symposium.

The Kathmandu Symposium on the coldwater fishes made pertinent recommendations covering three major themes: (1) distribution and conservation of coldwater fishes; (2) role of coldwater fishes in rural development and poverty alleviation; and (3) coldwater fisheries and aquaculture development.

The Symposium recommended regional cooperation among countries of the Trans-Himalayan region be strengthened for effective sharing and exchange of skills, experiences and technical cooperation. To support this regional cooperation, the symposium recommended a network for development and conservation of coldwater fisheries be established among concerned nations in the Trans-Himalayan region, coordinated by a center located in a suitable country within the region. International support was also requested for this important regional initiative.

This report of the Kathmandu Symposium on coldwater fisheries, the first publication includes the detailed recommendations of the three working groups. The second publication will be the technical proceedings of the Kathmandu Symposium.

The Kathmandu Symposium was jointly organized by Directorate of Fisheries Development, Ministry of Agriculture and co-operatives, His Majesty's Government Nepal, Nepal Agriculture Research Council, Food and Agriculture Organization of the United Nations and Network of Aquaculture Centres in Asia-Pacific in co-sponsorship with Nepal Fisheries Society, The World Conservation Union and World Wildlife Fund. It was hosted by the His Majesty's Government of Nepal. It was held at the Hotel Yak & Yeti in Kathmandu.

# 2. Report

## 2.1 Background

The Himalayan Range feeds some of the larger river systems in the world. Originating in the Himalayan Range, the River Ganges, River Bramaphutra, River Indus and their tributaries support and at the same time threaten the livelihood of millions of people in the Trans Himalayan Region as they flow to the sea. Countries in this region are some of the most densely populated in the world, comprising approximately 1/5 of the world's population.

Rivers of Himalayan origin are inhabited by and utilized as breeding and nursing grounds by several economically important indigenous fish species such as the snow trout (*Schizothorax spp*., *Schizothoraichthys spp.*), katle (*Neolissochilus hexagonolepis*) and mahasheer (*Tor spp.),* Jalkapoor *(Clupisoma garua)* and Himalayan-trout *(Barilius spp.) .* Exotic species such as brown trout (*Salmo. trutta*) and rainbow trout (*Oncorhynchus mykiss*) have been stocked in several rivers within the Himalayan Range and are now common in these areas. Additionally, species from the region have been used in other areas of the world to improve inland fisheries in rural mountain areas, for example snow trout and mahasheer have been introduced to the highlands of Papua New Guinea.

The indigenous and exotic fish species in the Himalayan Range contribute to the livelihood of the rural population and play a positive role in maintaining a balanced aquatic environment in the region. Indigenous species are an important component of the region's biodiversity and are a valuable genetic resource for the future. Unfortunately, these fishes are threatened due to environmental degradation and human activities. There is an urgent need for a consolidated regional effort to promote their conservation and to develop and implement effective management strategies for maintaining healthy fish stocks and improving rural livelihoods.

Currently, some individual countries have attempted to collate information with regard to exploitation, breeding and status of such species, but as yet there has been no coordinated regional effort. As the watersheds inhabited by the more important species are shared by a number of nations, a regional cooperative effort is necessary to share experiences and initiate collective actions to conserve and manage these shared aquatic resources.

This symposium was convened to compile information and issues related to coldwater fish species and their exploitation for developing a future plan of action on the sustainable use and conservation of these unique indigenous resources as an important part of the region's aquatic biodiversity.

## 2.2 Objectives

The objectives of the symposium are:

- to share and compile information on the status of indigenous fish species in the Trans Himalayan Region. Their importance in people's livelihoods, as a food source, as a genetic resource, their cultural importance and to determine current levels of exploitation;
- to evaluate the status of exotic species, their interactions with indigenous species, and the advantages and disadvantages of their presence;
- to share experiences on current research, development and conservation efforts among symposium participants; and
- to formulate strategies for future conservation and sustainable use of indigenous species, including opportunities for regional collaboration among Trans Himalayan countries

## 2.3 Organization

The Symposium on the Cold Water Fishes of the Trans-Himalayan Region was hosted by His Majesty's Government of Nepal on the $10^{th}$-$13^{th}$ July in Kathmandu. The Symposium, opened by the Rt. Honourable Prime Minister of Nepal and presided by the Honourable Minister of Agriculture and Cooperatives and Foreign Affairs, brought together over 70 scientists, planners, policy makers, private

entrepreneurs, representatives of international and regional organizations and rural development specialists from 10 countries of the Trans- Himalayan and neighboring regions.

Inaugural ceremony of the Symposium was held on the morning of 10 July. Welcoming words and expressions of gratitude to participants and their organizations Governments, sponsors of the Symposium were spoken by host government authorities and the representatives of FAO, NACA. The speech of Secretary of Agriculture and Cooperatives of Nepal Mr. R. L. Kayastha, Programme Director of DOFD, Nepal, NACA co-ordinator, Mr. Pedro Bueno, FAO country representative of Nepal Mr. Winston. Rudder and NARC Executive Director Mr. Dhruva Joshy are given in Annexes 4.3 to 4.6 and 4.9 respectively.

The inaugural speaker was the Rt. Hon'ble Prime Minister of Nepal. Rt. Hon' ble Girija Prasad Koirala empesized using the enormous water resources and available technologies for the development of coldwater fisheries in the Trans-Himalayan region, he urged the concerned parties participants as well as experts and professionals to direct their effort for overall development of commercially important indigenous and exotic fish species not only in Nepal, but also in the region (Annex 4.7). The chairperson Hon'ble Chakra Prasad Bastola, Minister of Agriculture and Co-operatives, and foreign affairs of Nepal in his concluding remark assured the commitment of HMG/Nepal to follow up the deliberations and discussion in the Symposium with great interest and expressed the willingness of HMG/Nepal to actively participate and contribute in this essential effort (Annex 4.8)

The symposium was designed to review and consolidate information, experiences, ideas and findings related to the fish species distribution, fishing intensity, impact of environmental degradation, conservation measures and aquaculture technologies for indigenous and exotic cold water fishes in the region. Besides the opening concerning the whole Symposium programme was divided into 9 Technical sessions. Eight countries status paper on coldwater fish species were presented by their experts in the plenary session 1 & 2. It was followed by three thematic review papers along with twenty one technical papers related to them. The full text of the papers with list of contributor will appear in the Proceedings of the Symposium on the coldwater fishes of the Trans-Himalayan Region, Kathmandu.

To enhance further and provide more sharply focused examination of critical issues the plenary session were followed by discussion thematic areas through three working groups (see # 3.1 and 3.2). Each working group presented their report with recommendations in the plenary session to get input from other groups.

The closing session was chaired by Mr. R. L. Kayastha, Secretary of Agriculture and Co-operatives of HMG/Nepal. The summary statement from the Symposium was presented by Dr. Deep B. Swar, Programme Director of DOFD and Member Secretary of the Symposium organizing Committee. Which was unanimously adapted by the house. Representative from FAO, Dr. Devin Bartley and NACA, Mr. Pedro Bueno expressed their pleasure and satisfaction for the successful completion of the Symposium. The Director General of the Department of Agriculture of HMG/Nepal, Mr. Asheshwar Jha expressed the gratitude to participants and their organization, governments, NGOs, sponsors of the symposium and individuals and institutions that rendered assistance to the symposium. Secretary Kayastha, in his concluding remarks, ret iterated the firm commitment of HMG/Nepal to take necessary action to implement the recommendations of the symposium.

## 3. Summary Statement from the Symposium

The country reports and technical resource presentations and Symposium discussions provided an important opportunity to review the status of cold water species in fisheries and aquaculture, to examine the role of these aquatic resources in the livelihoods of people living in the coldwater regions of the Himalayas, and to formulate strategies and recommendations for future fisheries and aquaculture development.

The Trans-Himalayan region is characterised by very low levels of human development and Symposium participants emphasized that special efforts are necessary to alleviate poverty and improve human development within this large and globally important ecosystem. The special characteristics of the region have led to the development of unique and diverse fishery and human resources, but they have also contributed to the economic hardship of the people. Thus, urgent efforts are required to alleviate poverty whilst conserving the unique biodiversity of the region.

The participants of the Symposium recognized the important role of fisheries for the population within the Trans-Himalayan ecosystem. However, it noted with concern that living aquatic resources of the region have rarely been considered in rural development initiatives. Discussions during the workshop provided excellent examples of fishery development, poverty alleviation, conservation, and that technological advances do exist in the Trans-Himalayan region, but that the information is not widely disseminated or shared and so progress is slow. A key issue is better communication and sharing of these experiences.

Recognising the need to raise the profile and awareness of aquatic biodiversity and the role of aquatic resources in poverty alleviation, the Symposium urged national governments to give greater attention to fisheries development. The Symposium stressed that fisheries development in the Trans-Himalayan region must be integrated within the overall development strategy, considering a wide range of components, such as agriculture and hydro-electric generation, conservation, social and economic aspects, and poverty alleviation. This broad approach is known as the "ecosystem approach" with improvement of human development as a core objective. The Symposium emphasised that development should be based on the best scientific information available and strive to conserve the valuable human and aquatic diversity within the region, with strict adherence to its sustainability. Attention should be paid to the FAO Code of Conduct for Responsible Fisheries and the relevant Technical Guidelines.

Based on the deliberations during the Symposium, working groups prepared detailed reports and recommendations covering three major themes: (1) distribution and conservation of cold water fishes; (2) role of cold water fisheries in rural development and poverty alleviation; and (3) coldwater fisheries and aquaculture development. The findings, strategies and recommendations from the working groups will be provided in the Symposium report. The following synthesises the major findings and recommendations prepared by each working group.

**A. Distribution and conservation of cold water fishes:**

Highest priorities for action common to most countries of the region are the following: (a) research into aquatic ecosystems especially the biology and behaviour of coldwater fish stocks, migration patterns and environmental impacts; (b) strengthening of data collection and dissemination; (c) training and education in specialised fields, such as stock assessment, fish migration behaviour, genetics and limnology; (d) policy development especially in integrated watershed development, gender equity and community management; and (e) regular monitoring, paying close attention to the management of fisheries resources through enhancement.

**B. Role of cold water fisheries in rural development and poverty alleviation:**

There is an urgent need to address poverty through improvement in aquatic resources management. The recommended approach is: (a) base aquatic resource management interventions on the understanding of socio-economic conditions and livelihoods of fisher communities; (b) promote local ownership of fisheries and locally based management arrangements and solutions to fisheries management problems; (c) explore livelihood alternatives for fishing communities, including small-scale aquaculture in mountain areas; (d) promote inter-sectoral co-operation and coordination between fishery and other sectors concerned with rural development and water resources development; (e) support the development of local services that meet identified needs of local people and are sustainable (this may involve partnerships between government, non-government, and the private sector); (f) improve communication and exchange of experiences and information resulting from the above; (g) develop policy that recognises the social and economic importance of aquatic resources and supports poor aquatic resource users. In support of implementation of this approach, existing information on socio-economic aspects of aquatic resources and management approaches should be collated and shared, research cooperation between social and fishery scientists should be promoted and training and education should seek to build skills in livelihood analyses and participatory approaches.

**C. Coldwater fisheries and aquaculture development:**

The strategies for aquaculture and fisheries development will consider the broad ecosystem approach with plans for both subsistence and commercial scales and must consider rural livelihoods. There are many options for development in the region, such as aquaculture and capture fisheries, sport fisheries, stocking of economically important species, and ornamental fisheries. The creation of development plans is a necessary first step for responsible aquaculture and fishery development. In light of the scarcity and gaps in knowledge, surveys and inventories of the biological, water and human resources of the region

should be undertaken. Fisheries and aquaculture development should not be pursued in isolation, but rather as vital components of overall development plans that address social, economic, and conservation issues. Thus, fisheries and aquaculture must be integrated with activities such as hydro-electric and agriculture projects. The region is rich in indigenous species. Therefore, the group recommended that preference be given to their promotion and that exotic species, already in use in the region, be managed and controlled. Technology and information transfer and education, especially on breeding of native fishes and on post harvest processing, will be required to optimize benefits from fisheries and aquaculture.

The countries of the Trans-Himalayan region are all making efforts to utilize coldwater fishes for the reduction of poverty and some successful strategies are emerging. Several problem areas are common and resources are shared among the countries in the region, with several trans-boundary issues, and collaborative action on a regional scale would probably be the only cost-effective way to address these common problems. The Symposium therefore recommended regional cooperation among countries of the Trans-Himalayan region be strengthened for effective sharing and exchange of skills, experiences and technical cooperation. To support this regional cooperation, the Symposium recommended a network for development and conservation of cold water fisheries be established among concerned nations in the Trans-Himalayan region, coordinated by a center located in a suitable country within the region. International support should be provided for this important regional initiative.

The Symposium requested FAO, NACA and interested donor agencies to provide technical and financial support to the building and operation of this network, and to promote effective linkages for sharing of experiences and information with other nearby areas within the Asian region, such as the MRC and Mekong river basin countries.

The Symposium further requested that governments transmit the recommendations of the Symposium to the International Year of Mountains in 2002 for incorporation into this important initiative. The International Year of the Mountains will focus on the problems of landlocked mountainous regions, which have many impoverished communities and have the most fragile ecosystems in the world. The Symposium requests governments to use the International Year of the Mountain agenda to call for support to coldwater fishery resources development, highlighting their significance in rural development and poverty alleviation.

The Symposium thanked the host government of HMG/N and representatives from local agencies/organizations, the participating governments and representatives of Bangladesh, Bhutan, Cambodia, China PR, India, Iran, Myanmar, Pakistan, Thailand, international and regional and local organizations such as FAO, NACA, WWF, IUCN, NEFIS, HARP, BIWMP and the MRC for their contribution and support and requested the governments and organizations give priority to further collaboration and to support in their future programmes.

As an immediate follow up to the Symposium, participants requested FAO and NACA to consult with the Government of Nepal, the other nations of the region, other relevant agencies and donors to help prepare action plans for implementing this regional initiative.

## 3.1 Terms of Reference

The Symposium is basically to formulate appropriate strategies relating to bio-diversity, conservation and socio-economic utility of the fishes inhabiting the coldwater of the Trans-Himalayan Region. The recommendations from the Symposium will provide the basis for research and development in future. The Symposium involves planners and decision makers, development workers, researchers and educationists, entrepreneurs and farmers involved in this field. The participation of a wide range of expertise will provide a strong basis towards formulating appropriate strategies for future interventions to support development of coldwater fisheries in the region.

To identify development strategies for coldwater fisheries and prepare follow up recommendations, the Symposium will divide into three working groups as follows:

Group 1: Distribution and Conservation of Coldwater Fishes

Group 2: Role of Coldwater Fish and Fisheries in Rural Development

Group 3: Coldwater Fisheries and Aquaculture Development:

Each group will discuss and prepare a draft report (approx. 2-3 pages) for presentation to the plenary session on the morning of the 13th July following the guidelines below. These guidelines are provided to guide discussions and reporting for each group.

### Group 1: Distribution and conservation of cold water fishes

This group will review the status of the coldwater fishes and their distribution, biodiversity and conservation of coldwater fisheries in the region. The following points are suggested to consider during group discussion, however, the group may make further additions of pertinent issues as required.

1. Present state of knowledge of distribution and status of coldwater fishes
    a. Present knowledge
    b. Gaps in knowledge
2. Experience in coldwater fish conservation
    a. Present knowledge (with examples of approaches and reasons for success or failure)
3. Recommended strategy and issues for conservation of cold water fishes
    a. Major elements of the strategy
    b. Issues/constraints to address (national and regional issues)
4. Priorities for follow up action
    a. Research
    b. Information exchange
    c. Training and education
    d. Policy development
    e. Regional cooperation
    f. Institutional development/capacity building

### Group 2: Role of Coldwater Fish and Fisheries in Rural Development:

This group will consider the role of coldwater fishes in social and economic development in rural areas and poverty alleviation. The group will attempt to analyse the socio-economic importance of coldwater

fisheries and their role and potential contribution improving rural livelihoods and the rural economy. The following points are suggested to consider during group discussion, however, the group may make further additions of pertinent issues as required.

1. Present state of knowledge of social and economic importance of coldwater fishes
    a. Present knowledge of role of cold-water fishes for income/food
    b. Gaps in knowledge
2. Experience in social and economic development and poverty alleviation through coldwater fisheries and aquaculture development
    a. Present knowledge (with examples of approaches and reasons for success or failure
3. Recommended strategy for coldwater fisheries and aquaculture to contribute of rural development and poverty alleviation.
    a. Major elements of the strategy
    b. Issues/constraints to address (national and regional issues)
4. Priorities for follow up action
    a. Pilot projects
    b. Research
    c. Information exchange
    d. Training and education
    e. Policy development
    f. Regional cooperation
    g. Institutional development/capacity building

## Group 3: Coldwater Fisheries and Aquaculture Development:

The status of fisheries and aquaculture in the coldwater of the region and their prospect for commercialization will be reviewed to formulate appropriate strategies with recommendations for future intervention. The following points are suggested to consider during group discussion, however, the group may make further additions of pertinent issues as required.

1. Present state of knowledge of fisheries and aquaculture development
    a. Present status of fisheries and stocking programmes
    b. Present status of aquaculture – species, systems etc
2. Experience in coldwater fisheries and aquaculture development:
    a. Present knowledge (with examples of approaches and reasons for success or failure)
3. Recommended strategy for coldwater fisheries and aquaculture development
    a. Major elements of the strategy
    b. Issues/constraints to address (national and regional issues)
4. Priorities for follow up action
    a. Pilot projects
    b. Research
    c. Information exchange
    d. Training and education

e. Policy development

f. Regional cooperation

g. Institutional development/capacity building

## 3.2 Group Report

## Group 1: Distribution and Conservation of Coldwater Fishes and Fishery Resources

Chair Person: Mr K. G. Rajbanshi, RONAST, Nepal

Facilitator: Dr. Tomi Petr

Repporteurs: Dr. Gerd Marmulla, Fishery Resource Officer, FAO, Rome

Dr. J. Shrestha, Professor, TU

Mr. Kishor Kumar Upadhaya, Fisheries Officer, KGEMU

Members: M Yaqoob, Sajjad Zahir, Yadullah Mehrabi, G. Marmulla, K.K. Upadhaya, S.R. Gubhaju, Mailani Shrestha, Shankar Dahal, D,M. Singh, Gagan B. Pradhan, Agni Nepal, P. Buenp.

### Considerations in the discussion:

The Group added "fishery resources" to include and turn attention to the resources other than fish. Discussion scope was confined to 5 countries within the Trans-Himalayan Region, However, it was noted that many species of the Himalayan ranges have distribution outside of the region. Future discussions as well as follow up actions from this Symposium should also consider countries with the same coldwater species and genera.

**A. Present state of knowledge and distribution status of coldwater fishes in five countries of the Trans-Himalayan Region**

**Bhutan**

No statistics FAO has only estimates distribution virtually unknown although some species available only 41 indigenous and 1 exotic species reported compared to the 156 indigenous species in Nepal; status of fisheries and fisheries resources unknown Conclusion – considerable gaps in knowledge, inventory needs to be updated, no publication available specifically on fish and fisheries of Bhutan

**China**

No inventories available. Only one information available on fish production in the upper course of Brahmaputra – 1990. Gaps – in all aspects of the subject

**India**

Present knowledge considerable, 218 species listed for Himalayas; a number of publications available on coldwater species Fish and capture fisheries reasonably well known but no detailed annual statistics that would separate coldwater fishes from total Indian production. Gaps – yields not known for coldwaters especially for rivers,

**Nepal**

List of species available for a number of water bodies but a number of rivers need

to be inventoried

Summary list of species available

Fisheries statistics available for river fisheries.

Yields as well as CPUE for some rivers available

Generally levels of exploitation poorly known as fisheries are subsistence in character

Gaps – fishery distribution needs to be completed and inverntory of species need to be revised

Better information on standing stocks of rivers should be made available to avoid over exploitation

**Pakistan**

Species list available for selected coldwater bodies i.e. Kabul RIver and Jhelum and also for northern areas (25 species) and AJK with 38 indigenous and 7 exotics in coldwater and transitional zones,

Status of fish stocks is poorly known with exception of brown trout – well distributed in northern areas and reproducing

Information on river production available only for NWFP; more information available on trout culture.

Gaps:

No management for indigenous fish like snow trout, mahseer etc

No comprehensive publication devoted to coldwater species

Statistical surveys are needed

Regional – lack of knowledge from other important territories as Sikhim, Arunachal Pradesh,

**B. Failures and Successes in Conservation**

**Bhutan**

Traditional belief systems seem to be assisting in conservation

Bhutan has a conservation law (that works by licensing) except in national parks, and sanctuaries; Streams and rivers at monasteries and temple pools become – by religious observance – automatically fish sanctuaries.

Sport fishery is limited as a result of controls on the number of tourists allowed into the country. The affluent locals also sport fish.

Aquaculture of warm-water species would also relive pressure on coldwater species.

Much of the fish consumed in the cities are imported.

Stocks of indigenous coldwater fish do not seem to be at present endangered. However, there is some concern about the possibility of competition between the introduced brown trout and indigenous species such Schizothorax and Schizothoraichthys. (Because of this concern, the existing brown trout hatchery was closed?)

**China**

Not known. But over-exploitation is suspected in the catchments of the “Yarlung Zangbo” River and high altitude lakes on the northern side of the Himalayas.

**India**

Stocks are under heavy pressure.

Conservation sites such as temples serve as refuge for coldwater species.

Overexploitation, pollution sites, damming of rivers have reduced species diversity in a number of water bodies.

Introductions of exotics might have compensated for these reduction in the numbers of indigenous fish or in some cases, increased species diversity.

Competition between introduced and indigenous fish in some water bodies might have impacted on species diversity.

India has declared *Tor putitora* as endangered.

Urgent need for mitigation measures in a number of coldwater bodies.

**Nepal**

Efforts to protect coldwater fish stocks are often negated by activities outside the sector, particularly in watersheds such as deforestation, poor agricultural practices,

Efforts at re- stocking of rivers are inadequate

Urgent need for mitigation measures and stronger inter-sectoral collaboration

There are no identified and established fish reserves and refuges that would serve to conserve gene pools.

Impact of introducing species for aquaculture and the potential danger of their escape into wild-water needs to be paid close attention as it could negatively impact on the indigenous coldwater species.

Unregulated trans-boundary movement of fish species may pose a potential negative impact on coldwater fish biodiversity

EIA is now required and being conducted in dam constructions

**Pakistan**

As elsewhere conservation measures are needed to protect fish stocks, biodiversity and to sustain production. In some areas mitigation measures are required.

**Regional concern**

Enforcement of existing laws and regulations is weak so that illegal fishing and illegal and destructive practices are still widespread in the region.

## III. Recommended Strategies and Issues and Management Strategies for Conservation of Coldwater Fisheries

**Bhutan**

Issues: General lack of information on the coldwater fisheries as to conservation,

Strategy: Collaboration and cooperation with SAARC in fishery development to exchange technical knowledge

**China**

No information available but with strong likelihood that the considerations that refer to India equally apply (see below)

**India**

Issues/Constraints

Over exploitation

Pollution

Siltation

Damming and Water diversion

**Strategy**

Overexploitation

- community approach – i.e. co-management
- enforcement of existing laws and regulations
- establishment of refuges
- enhancement
- mitigation

Pollution

- inter-sectoral dialogue
- legislative action on polluters
- promotion of good farming systems that minimize chemical runoffs

Siltation

- develop a river/lake basin protection criteria for land users
- intensify inter-sectoral dialogues
- participatory management of watersheds and basins
- promotion of good farming systems and soil conservation practices

Damming and water diversion

- inclusion of fish and fishery requirements in planning for the construction and implementation phases r schemes
- adhere to implementation of EIA with respect to conserving sound fish populations and species diversity in modified water bodies
- Specify minimum requirements for individual fish life stage to protect the resource

**Nepal**

Issues :as for India

Strategies: as for India

**Pakistan**

Issues: As for India

In addition, there is a very inadequate institutional support to meet demands for sustainable coldwater fish stock management

**Regional Strategy**

Intensify awareness of the importance of coldwater fisheries and fishery resources in social and economic development.

Develop close cooperation among countries in research, protection, conservation,

management and sustainable exploitation of coldwater fish stocks.

Inventory of institutions in the region concerned with work on coldwater fish species in the areas of research, management, conservation, protection, legislation and information. Assessment of capabilities and competencies. Engage the cooperation of international organizations in addressing the needs of the region especially with regards to improving social and economic and nutritional status of the people in remote rural areas of the highlands.

Promote interagency collaboration in the conservation of coldwater fisheries and fishery resources.

| **C. Group 1: Priorities for Follow-up Action** | | | | | |
|---|---|---|---|---|---|
| | **Bhutan** | **China** | **India** | **Nepal** | **Pakistan** |
| **Research** | | | | | |
| Distribution | XXX | n.i. | X | XX | XX |
| Biol/behavior | X | n.i. | X | XXX | XXX |
| Env. impacts | X | n.i. | XXX | XXX | XXX |
| Migrations | X | n.i. | X | XXX | XXX |
| | | | | | |
| **Information** | | | | | |
| Statistics<br>- stocks<br>- fishers | XXX | XXX | XX | XX | XXX |
| Data Banks | XXX | X | XX | XX | XXX |
| Reporting and Exchange | XX | XXX | XX | X | XXX |
| Resources<br>- manpower<br>- material | XX | X | X | X | XXX |
| | **Bhutan** | **China** | **India** | **Nepal** | **Pakistan** |
| **Training and Education** | | | | | |
| Limnology | XXX | X | X | XX | XXX |
| Genetics | XXX | X | X | XX | XX |
| Migration behavior | XXX | XX | X | XXX | XXX |
| Stock assessment | XXX | X | X | XX | XX |
| | **Bhutan** | **China** | **India** | **Nepal** | **Pakistan** |
| **Policy Development** | | | | | |
| Environment | X | n.i. | X | X | X |
| Conservation | X | X | X | X | X |
| Integrated Watershed Development | XXX | n.i. | X | XX | XXX |
| Gender equity | XXX | n.i. | XXX | XXX | XXX |
| Community Management | XXX | n.i. | X | XX | XX |
| Micro-credit | n.i. | n.i. | X | XX | XX |
| | | | | | |
| **Management** | | | | | |
| Monitoring | XXX | XXX | XXX | XXX | XXX |
| Enhancement | X | n.i. | XX | XX | XXX |
| | | | | | |
| **Regional Cooperation** | XXX | XXX | XXX | XXX | XXX |

xxx- high priority xx - medium x - low n.i. no information

## IV. Recommendations

### General

There are several problem areas common to several countries in the region. It is increasingly evident that solving such problems may either be above the capability of an individual country or is financially demanding and that collaborative action on a regional scale is the way to solve these common problems. It should be noted that the issues reach beyond the capacity of sectoral solution as broader environmental considerations are frequently involved. In such situation regional collaboration with international support is required.

The year 2002 has been declared the Year of the Mountains. It will focus on the problems of landlocked mountainous regions, which represent mostly the impoverished communities and most fragile ecosystems in the world. It seems most appropriate to include in the Year of the Mountain agenda a call for support to coldwater fishery resources, highlighting their significance as protein source for remote communities living largely a subsistence way of life, where fish is one, but a rapidly diminishing source of animal protein.

## V. Recommendations to Address Common Problem Areas:

1. Need for better knowledge on fish stocks on the level of their exploitation

   - Shortage of good data banks hampers formulation of planning and management programmes on coldwater fishery resources. This concerns especially the gaps on information on fish stocks of many water bodies in the region

   - Poor information on the fishing pressure, which is largely of subsistence character and therefore difficult to assess but very important to know.

2. Need for the evaluation of management measures already applied especially on the effectiveness of enhancement (stocking, rehabilitation of spawning grounds, fish ways efficiency, etc).

3. Urgent needed to evaluate the performance of the efforts to harmonize fishery with other uses of water resources. This include the land use in catchment. Also a urgent to device efficient measures to reduce presures on land and water resources that are harmful to fisheries. This involves social and economic studies and reviews of the effectiveness of existing legislation.

## Group 2: The Role of Coldwater Fish and Fisheries in Rural Development

### Background

The working group considered the role of coldwater fishes in social and economic development and poverty alleviation in rural areas of the Trans-Himalayan region. The group attempted to analyze the following:

- Present knowledge on the socio-economic importance of coldwater fisheries and aquaculture.
- Existing experiences in fisheries and aquaculture for poverty alleviation within the region.
- Strategy for fisheries and aquaculture development to contribute to poverty alleviation.
- Recommended follow up actions to support implementation of this strategy.

## Working group members

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The group held wide ranging discussions based on the country papers, resource papers, discussions during the Symposium and personal experience. The following summarizes the main issues and recommendations arising during the discussions.

## Present knowledge on social and economic importance of coldwater fishes

The group addressed the question: What is the present knowledge of role of aquatic resources (fish, prawns, other spp) in livelihoods of rural people?

Present knowledge indicated that within the Trans-Himalayan region aquatic resources are utilized by humans as:

- Food for fishing and aquaculture households and the public
- Income for fishing and aquaculture households
- Recreation and tourism for sport fishing, sometimes part of ecotourism.

However, knowledge on the socio-economic importance of aquatic resources in the Trans-Himalayan region is far from complete. There is evidence that aquatic resources are particularly important for poor people, but little information is available on consumption patterns, the role of fisheries in household nutrition, gender aspects, the influence of human migration on fisheries and other socio-economic aspects.

The group noted that fishing household tend to come from marginilised household – the "poorest of the poor". Fisheries are a last resort source of food and income for poor people. Other countries were not represented in the group and therefore a general picture of the Trans-Himalayan region could not be provided. The following examples were provided by group members during discussions:

- Nepal – 51,000 households in Nepal. In some localities, such as the Sheti river area, the total number of households involved in fishing is substantial. Out of 700 households, 60% were part time fishermen.
- Bangladesh – there are 500,000 people living in mountain areas – of these there are 10,000 households involved full time in fisheries.

There is some knowledge on selected local areas, but the information is fragmentary and does not cover the region. The group noted various problems with current information on socio-economic aspects and gaps in knowledge including:

- More information was available on technical aspects of fisheries and aquaculture, but less on social and economic aspects, including markets.
- Geographical coverage of fisheries data and development projects tended to give less attention to highland areas.
- Information on the role of women in fisheries.

This lack of knowledge contributes to:

- Lack of influence of the fisheries sector (and the people involved) in policy formulation.
- Inadequate of consideration of fisheries and aquaculture in rural development strategies.
- Lack of representation from poor highland people in policy processes that influence aquatic resources.

The group emphasized the need to develop a clearer knowledge base on the social and economic values of aquatic resources in the Trans-Himalayan region.

## Experiences in aquatic resources management and poverty alleviation

The group discussed existing experiences in poverty alleviation through fisheries and aquaculture development. Although aquatic resources are important in the livelihoods of some of the poorest of the poor landless people in the region, the group noted that unfortunately there is very livited experience where fisheries management or aquaculture development processes have specifically addressed poverty alleviation.

There are experiences where water resource projects have been implemented without proper consideration of the value of fisheries and their importance to poor people, leading to negative impacts on the livelihoods of poor people.

Some experiences were provided in Nepal from lakes and reservoirs where fisheries development projects have been implemented to support poor fishermen. In Pokhara valley, for example (a midland area), fisheries enhancement and cage culture was reported as a successful example of alleviation of poverty among fishers. A similar approach is being tried in Kulekhani reservoir. There was less experience in river management and in more remote mountain areas.

Regarding the involvement of women, a women's group was also established in Pokhara for direct involvement in fish production and marketing. There were experiences with women's involvement in aquaculture in the Terai region of Nepal, that may be applicable to the highland areas, if aquaculture can be promoted.

The group noted that the successful experiences had all involved the social empowerment and organization of local fishers. Learning experiences from community forestry had also helped in the development of these management approaches.

There was less experience within the Trans-Himalayan region on small-scale aquaculture. Lack of inputs supplies (particularly fish seed) due to poor infrastructure, and limited extension support in remote areas were considered to be major constraints.

## Recommended strategy for rural development and poverty alleviation through coldwater fisheries and aquaculture

The group could not formulate a detailed strategy for rural development and poverty alleviation through fisheries management of aquaculture development. Rather a set of objectives and strategy elements that might be applied more generally were prepared and examples provided where available to support the approach.

## Objectives:

To alleviate poverty of people of the mountain areas and maintain biodiversity should be driving forces behind any strategy that will be developed concerning fisheries of the Trans-Himalayan region.

The group emphasised the importance of evolving national policy in support of these important objectives.

The present status of the Himalayan fisheries calls for the improvement of existing management systems, and where possible, for exploration of alternatives livelihoods for fishers, either within the sector ('fish-based') or in other sectors.

## Strategy:

During the discussion it became clear that there is a lack of knowledge concerning the socio-economics of fisheries. Technical achievements and research concerning aquaculture have not reached the grassroot-level and effective transfer through existing administrative structures from centre to district to grass roots level is lacking. Research in both fields (technical and socio-economic) should be done, dealing with the Trans-Himalayan fisheries. Building a baseline of socio-economic information will help future development of the fisheries.

Based on existing experiences the following elements should be considered as part of the development strategy at all levels:

### 1. Base management interventions on the understanding of socio-economic conditions and livelihoods of fisher communities.

The group recognized the need to base management decisions and small-scale aquaculture interventions on a solid understanding of the livelihoods of poor fishers and the participation of fishers in development of management recommendations.

### 2. Promote local ownership of fisheries and locally based management arrangements.

There is no one 'model'. Examples from Nepal suggest that local user groups, such as the fisher's groups found in lakes in the Pokhara valley have considerable potential for fisheries management. In other areas, co-operatives and other locally driven and based arrangements may be more suitable. The group considered the following should be considered in establishing local management arrangements:

- Develop a sense of ownership of aquatic resources among individuals and local groups.
- Ensure property rights and land ownership issues are addressed in management.
- Within the locally agreed management arrangements, conservations of stock may be supported by considering:
    - Restricting fishing within certain periods, giving stocks opportunities to recruit.
    - Protecting spawning areas and other important habitats
    - Local enforcement of regulations against illegal harvesting practices.

The exclusion of migrant fishers, who tent to be very poor, is a concern when establishing user groups, and should be considered and preferably avoided. In this respect stakeholders should be clearly identified and user rights defined, supported by law as required. In short, management should be based on understanding of the livelihoods and knowledge of the needs of the people involved.

### 3. Explore livelihood alternatives for fishing communities.

It is likely that the number of fishing households involved in wild fisheries cannot be expanded, and that poverty alleviation among fisher communities will require attention to alternative livelihoods. These livelihood alternatives may be found within the fishery sector (examples were provided of local fish marketing activities, sun drying of fish by women's groups, making of nets, perhaps small-scale aquaculture), and outside of the fishery sector (agriculture, tourism, and others). It is important to consider other enterprises as part of an integrated approach. For example, landless fishermen in some highland areas in Nepal became successfully involved in vegetable production as a fishing alternative.

The group considered that special attention be given to explore the opportunities for small-scale aquaculture in mountain areas. This investigation should be based on careful consideration of the needs and constraints faced by the poor farmers within the region. (lack of seed, marketing, transport difficulties). The opportunities for ornamental fish culture and fisheries development as part of eco-tourism activities should also be investigated.

### 4. Promote inter-sectoral co-operation and coordination

The group recognized the importance of joint-up working between fisheries and other sectors (especially, the water resources sector, agriculture and eco-tourism). A more inter-sectoral approach is necessary to address the multi-sectoral needs that arise in development initiatives addressing poverty.

Further, the group recognized that cooperation and exchange of experiences with sectors involved in community mobilization and social forestry may provide valuable lessons for the fishery sector. Efforts should be made for fishery scientists to work with projects involved with multi-sectoral rural development.

**5. Support the development of local services that support the identified needs. This may involve partnerships between government, non-government, and the private sector.**

The development of fishery and aquaculture requires local support services, such as extension. Such services are in the fishery sector are often lacking. Therefore there is a need to explore and build capacity of local institutions and partnerships to support fishery users groups and better management of fisheries and aquaculture. These partnerships may involve local fishers group, government and non-government agencies.

**6. Improve communication and exchange of experiences and information resulting from the above.**

The group recognized that the fishery sector is learning about these new approaches to management and poverty alleviation. Therefore, the importance of effective exchange of experiences was emphasized, and gradual building of knowledge and approach based on these experiences.

In particular, greater emphasis must be placed by development planners to ensure that projects which affect use of water resources have legally required EIA's which must include local representation of concerned stakeholders, especially hydro dams and irrigation schemes which may have an impact upon fisheries and aquatic resources.

**7. Develop policy to support poor aquatic resource users**

There is a need t further develop policy and governance processes that reflect the needs of poor aquatic resource users. So far, there has been limited attention to aquatic resources in rural development strategies and policies. Therefore, there is a need to ensure that the better management experiences and voice of poor aquatic resource users are properly communicated and inform the development of policy.

The group considered that fisheries should get more attention in policy development. Because of the low social status of the people involved fisheries, poor people may get less attention when policies are being developed. However, the importance of fisheries to the livelihoods of the poorest of the poor is significant.

**8. Implementation of the approach**

The group recognizes that there are considerable constraints to address (national and regional issues) in promoting this approach. The follow up actions below provide recommendations to support gradual implementation of the strategy within the nations of the Trans-Himalayan region.

**Priorities for follow up action**

The following group considered the follow up actions necessary to support the countries of the Trans-Himalayan region to implement the strategy approach outlined above.

### Information:

The available information on the socio-economics conditions and livelihoods of fishing communities within the Trans-Himalayan region, including experience in local management arrangements, should be collated and widely shared. There should be continuous efforts to promote collate information and promote testing and sharing of approaches to aquaculture and fisheries management in mountain areas, within the sector, and with other sectors involved in rural development.

Technical guidelines should be prepared on incorporating social and environmental aspects of fisheries within EIAs.

### Implementation of pilot projects:

A number of carefully selected pilot projects, of learning initiatives, should be implemented based on local needs. Pilot projects should be established to develop approaches to address poverty alleviation among fisher communities and community participation. The experiences from these pilot projects should be shared within and between countries as appropriate and used to build capacity and experience.

### Research:

The research priorities to support implementation of the strategy include (a) generating information on economic values and uses of aquatic resources; and (b) economic and social aspects of environmental change related to fisheries. The group further recommended that research agendas should be developed through participatory approaches and implemented through joint research involving fishery and social scientists.

### Training and education:

There is a need to build capacity in these new approaches to fishery management and small-scale aquaculture. Initially, emphasis should be given to capacity building in livelihood analyses, group organisation and participatory research. Emphasis should also be given to capacity building of fishers through awareness building, technology transfer, and development of real partnership with GO, NGOs and the fishers community of the region. Better sharing of training materials would be useful.

### Policy development:

There is a need for policy and institutional change based on the better understanding of rural livelihoods, aquatic resources and poverty that will arise from the gradual implementation of the strategy. This change can be supported by development of effective processes for communication with policy makers.

### Regional cooperation:

The countries of the Trans-Himalayan region are all making efforts to utilize coldwater fishes for the reduction of poverty and some successful strategies are emerging. The group recommended that regional cooperation among countries of the Trans-Himalayan region be strengthened for more effective sharing and exchange of skills, experiences and technical support for the nations of the region.

Considering the important role of cold water fisheries, the group suggested that a network for development and conservation of cold water fisheries be established among concerned nations in the Trans-Himalayan region, coordinated by a center located in a suitable country within the region. The network would support among others:

- Technical cooperation among Trans-Himalayan nations (TCDC) in cold water fisheries and aquaculture.
- Development and access to databases on cold water fisheries and aquaculture.
- Training.
- Coordination of research within well structured research programmes.

FAO, NACA and interested donor agencies were requested to consider providing technical and financial support to the building of this network, and to promote effective linkages for sharing of experiences and information with other nearby areas within the Asian region, such as the MRC and Mekong river basin countries.

## Group 3: Coldwater Fisheries and Aquaculture Development

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Group 3 report is based on group discussions following the TOR and outline provided, including information from country and resource papers and individual experiences.

## I. Present state of knowledge of fisheries and aquaculture development

The present status of aquaculture and stocking programmes and fisheries are presented in Tables 1 and 2. Eleven species were identified as important for further aquaculture development; five of these are exotic to most of the sub-region. Eleven species were identified as important fishery resources. The majority of these species are declining in the wild, even when fishery management plans exist. Thus, further strategies and actions are needed for their continued use and conservation.

## II. Elements of Development Strategy

Strategies for aquaculture and fisheries development will consider the broad ecosystem approach. Development plans should be for subsistence and commercial scales and must consider rural livelihoods. Development plans must also consider relevant international and regional agreements and treaties, such as the World Trade Organization, the Convention on International Trade in Endangered Species of Fauna and Flora, and the Convention on Biological Diversity. Also important will be voluntary regional guidelines, such as the FAO/NACA Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals and the Beijing Consensus and Implementation Strategy. The participants of the working group identified elements of the strategy for aquaculture and fisheries development for coldwater species in the Trans Himalayan Region as follows:

## III. Aquaculture

The elements of a Strategy for Aquaculture Development include:

- Inventory and survey of species
- Promoting development of indigenous species: domestication (broodstock, genetic improvement)
- Technology transfer, training/education, extension, and research: modern technology (small and commercial scale) for culture systems (e.g. running water system)
- Control and management of exotic species
- Guidelines for hatcheries and culture systems including standardization
- Water Management
    - water quality

  - pesticide control
  - effluent control
  - enforcement
  - watershed integration (forest and agriculture)
- Integrated hydro-electric aquaculture
- Health management/quarantines
- Regional cooperation

The group identified ornamental fisheries as a potential area for development for cold water species. However special concerns should be addressed. The inventory and survey of species will also serve this purpose. Species selection will be important and should consider the following:

market issues (e.g. fish should be interesting), environmental (e.g. temperature) tolerance, acceptance of artificial feed, and captive breeding. The group also noted that fish hobbyist can be involved in breeding and conservation programs. Candidate species include golden carp, *Botia spp*., *Danio* spp. (zebra fish), and *Rasbora* spp.

**IV. Stocking**

For stocking (*i.e.* release of hatchery raised fish into the wild or open water bodies), the elements of a development strategy includes:

- Development of a management plan with enforcement
- Establishment of community fisheries for rivers and other water bodies
- Establishment of fishing cooperatives (e.g. to buy seed)
- Development of a release strategy
- Monitoring and assessment

**V. Capture fisheries**

The elements of strategy for capture fisheries are:

- Inventory/survey/stock assessment of fish, water bodies and people
- Consideration of ecosystem dynamics (*e.g.* ecosystem valuation; carrying capacity; suitability of habitats, nutrient load, etc.)
- Assessment of hydrography (*e.g.* flow regimes especially in dammed rivers)
- Fisheries management plan (regional level)
- Community fisheries management at local level
- Survey and assessment of crafts and fishing gears in terms of efficiency and legality (*e.g.* electro-fishing, explosives, poison)
- Integration with other sectors/activities (*i.e.* hydroelectric and agriculture)

## VI Sport fisheries

Sport fisheries may provide additional employment and benefit to the region. Potential species for further development include:

*Tor* species (Sahar, mahseer)

Snow trouts (Asala)

*Neolissocheilus hexagonolepis* (katle)

*Bagarius bagarius* (FW Shark, Goanch)

*Clupisoma garua* (Jalkapoor) Not endangered, but declining; long-distance migrant; no specific fishery management plan.

The elements of a strategy for sport fisheries will be the same as for commercial fisheries, but social and economic aspects may be different.

## VII Constraints

The group identified the following general constraints to the development of aquaculture and fisheries:

- Poor/weak communication and information flow between Trans Himalayan countries and within countries
- Lack of national and international coordination
- Infrastructure – roads/marketing system needs to be developed
- Post-harvest technology needs to be improved because of remoteness
- Lack of women empowerment (especially in these capture fisheries where women do most of the work)

The participants noted that good examples of fishery management, aquaculture technology, women empowerment, etc. exist in the sub-region, but this information is not widely disseminated and therefore the practices remain localized.

Priorities for Follow-up Actions

In identifying priorities for follow-up actions, the group noted that many of the actions are interrelated and should not be pursued in isolation. The group identified the following prioritized follow-up actions:

- Information exchange
  - annual workshop, staff exchange programmes, newsletter, resource center
- Policy development
  - Community fisheries
- Institutional development/capacity building
- Training and education
  - Trainer's training on
    - fish breeding
    - fisheries management
    - health management
    - EIA
      - Including monitoring and assessment
      - Mitigation measures
    - water quality management
- Pilot projects with regional focus
  - Technology transfer
    - Assessment and refinement of traditional methods of curing/processing - canning, smoking, salting, drying
  - Development of cold water lake fisheries (to restore lake, provide employment)
    - Development of cold storage facilities to reduce post-harvest losses
  - Germplasm conservation (living gene bank) for mahseer, snow trout
  - Investigation on migration and breeding biology of commercially important cold water fishes

- *In-situ* conservation of commercially important cold water species (integrate fishery management with protected areas and especially breeding grounds, legal component - for conservation of species)

**Table 1. Status of Aquaculture Development in the Trans- Himalayan Region**

| Common Name/ Species | Culture Systems/ Environment | Breeding Technology (Y=yes; N=no) | Conserva-tion Status | Grow Rate | Origin (Native / Exotic) | Migratory | Stocking (release in natural waters) |
|---|---|---|---|---|---|---|---|
| Golden mahseer **D. Tor putitora** | pond, cage, raceways | Y | threatened | Slow | Native | Highly | Nepal, India |
| Deep body mahseer **E. T. tor** | pond, cage | N | threatened | Slow | Native | Highly | No |
| T. nuy | pond, cage | Y | threatened | Slow | Native | Highly | No |
| Snow trout *Schizothoraxs Richardsoni* | pond | Y | declining | | Native | Limited | Nepal |
| River snow trout **F. S.progastus** | pond | Y | threatened | Slow | Native | Limited | No |
| Schizothorichthys esochnus | pond | Y | declining | Slow | Native | Limited | No |
| River trout **G. Gymnocypris** sp. | cages, pens | Y | Not threatened | Fast | Exotic | Resident | No |
| Rainbow trout Oncorhynchus mykiss | pond, raceway, reservoirs | Y | Not threatened | Fast | Exotic | Y | Nepal Unknown status (China) |
| Brown trout **H. Salmo trutta** | pond, cages (India) | Y | Not threatened | Fast | Exotic | Y | Kashmir |
| *Cyprinus carpio* communis (scaled and mirrored) | pond, cages | Y | Not threatened | Fast | Exotic (from China) | Resident | Nepal |
| Grass carp *Ctenopharyngodon idella* | ponds, cages | Y | Not threatened | Fast | Exotic Except China | Resident | Nepal India Bangladesh |

**Table 2. Status of Capture Fisheries of Cold Water Species in the Trans Himalayans**

| Species | Conservation Status | Fisheries Management Plan Exist? | Effectiveness | Migratory |
|---|---|---|---|---|
| ***I. Tor putitora*** | threatened | Y<br>Nepal, India<br>Bhutan | Licensing system, closed season: effective in Nepal<br>India – no<br>Bhutan – proposed | Highly |
| *T. tor* | threatened | Same as above | Same as above | Highly |
| Snow trout<br>*Schizothorax*<br>*Richardsoni* | declining | Y Nepal | Localized community<br>management but not effective (Nepal) | Limited |
| *S.progastus* | Same as above | Same as above | Same as above | Limited |
| *S. esochnus* | Same as above | Same as above | Same as above | Limited |
| ***J. Barillius bola*** | Not endangered, declining population | None | | Resident |
| *Anguilla bengalensis* | Threatened and declining | Local in Nepal | Not effective | Highly |
| *Bagarius bagarius* | threatened | Local in Nepal | Not effective | Highly |
| *Clupiosoma garua* | declining | None | | Highly |
| *Gymnocypris*<br>*Prezwalski* | threatened | Yes (China) - | effective | Resident |
| *Neolissochilus*<br>*Hexagonolepis* | threatened | Yes (Nepal) | effective | Yes |

# *4* Annexes

***Annex 4-1***

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***Annex 4-2***

## Symposium Programme

Registration: 09:00-10:30, Tuesday 10 July, 2001

| Date/Time | Activity |
|---|---|
| **10/07/2001** | |
| Inaugural Ceremony | |
| 10:30-12:15 | **Symposium Opening Ceremony**<br>*Arrival of dignitaries*<br>Right Honourable Girija Prasad Koirala<br>Prime Minister of Nepal<br>*Adoption of the Chairperson*<br>Honourable Chakra Prasad Bastola<br>Minister, Ministry of Agriculture and Cooperatives, HMG Nepal<br>*Introductions (Master of Ceremonies)*<br>***Welcome Adress***<br>Mr. Ratneshwar Lal Kayastha,<br>*Secretary, Ministry of Agriculture and Cooperatives HMG Nepal, and*<br>*Chairman, Symposium Organising Committee*<br>***Symposium Objectives and its Brief Introduction***<br>Dr. Deep Bahadur Swar<br>*Programme Director, Directorate of Fisheries Development, HMG Nepal, and*<br>*Member-Secretary, Symposium Organising Committee*<br>***Few Words***<br>Mr. Winston R. Rudder<br>FAO Representative<br>***Few Words***<br>Mr. Pedro Bueno<br>*NACA Coordinator*<br>***Inauguration of the Symposium***<br>Right Honourable Girija Prasad Koirala<br>*Prime Minister of Nepal*<br>***Felicitation of the Fisheries Expert and Former Director of Fisheries Mr. Rohit Bahadur Thapa on behalf of the Nepal Fisheries Society***<br>Right Honourable Girija Prasad Koirala<br>*Prime Minister of Nepal*<br><br>***Inaugural Address***<br>Right Honourable Girija Prasad Koirala<br>*Prime Minister of Nepal*<br>***Remarks***<br>Honourable Chakra Prasad Bastola<br>*Minister, Ministry of Agriculture and cooperatives, HMG Nepal, and*<br>*Chairman, Symposium Inaugural Ceremony*<br>***Vote of Thanks***<br>Mr. Dhruva Joshy<br>*Executive Director, Nepal Agriculture Research Council, and*<br>*Vice-Chairman, Symposium Organising Committee* |
| **12:15-13:30** | **Refreshments** |
| **13:30-17:00** | **Field Visit to Kakani, Nuwakot** |
| **11/07/2001** | |
| **Session-1** | *Chairman – Mr. Asheswar Jha, Director General, DOA HMG Nepal* |
| **08:30** | *Resource Paper Presentation –1*<br>(Tomi Petr), Coldwater fish and fisheries in the Trans-Himalayan Region |
| 09:00 | Presentation of country paper – Bangladesh |
| 09:20 | Presentation of country paper – Bhutan |
| 09:40 | Presentation of country paper – China |
| 10:00 | Presentation of country paper – India |

| Date/Time | Activity |
|---|---|
| 10:20 | Presentation of country paper – Iran |
| **10:40 –11:00** | **Tea Break** |
| Session-2 | Chairman: Dr. B. R. Pradhan, Director, Nepal Agriculture Research Council |
| 11:00 | Presentation of country paper – Myanmar |
| 11:20 | Presentation of country paper – Nepal |
| 11:40 | Presentation of country paper – Pakistan |
| 12:00 | Orientation about group discussion agenda. |
| **13:00** | **Lunch** |
| **Session-3** | **Chairman : Dr. Mahesh Banskota, Country Director, IUCN** |
| | **Technical Paper Presentation –1** |
| 14:00 | Zoogeographical distribution of coldwater fishes in the Trans-Himalayan Region of Nepal and their Biological Status (K.G. Rajbanshi) |
| 14:20 | Impact of Damming on the Aquatic Fauna in Rivers (S.R. Gubhaju) |
| 14:40 | Project induced impacts on Fisheries Resources and their mitigation approach in the Kali Gandaki – 'A' Hydro-electric Project, Nepal (K.K. Upadhaya and B.C Shrestha) |
| 15:00 | Management & Preservation of the giant fish species of the Mekong (Naruepon Sukumasavin) |
| 15:20 | Present Status and Prospects of Mahaseer Fishery in GarhwalRegion of Central Himalaya (A.P. Sharma and Mishra) |
| **15:40** | **Tea Break** |
| **Session-4** | **Chairman: Dr. Devin Bartley, Senior Fishery Resource Officer, FAO Rome** |
| 16:00 | *Resource Paper Presentation – 2*<br>Environment, livelihood and coldwater fishes in the Trans-Himalayan Region (Michael J. Phillips) |
| | *Technical Paper Presentation –2* |
| 16: 20 | Survey of Capture Fisheries in the Koshi River Basin (S.N. Yadav) |
| 16:40 | Prospect of Aquaculture Enhancement in Hydropower and Irrigation Reservoirs in Nepal (M.K. Shrestha and etal.) |
| 17:00 | The Current Status of Capture Fishery in Upper Sunkoshi River (R. Ranjit) |
| 17:20 | Mahaseer ranching in coldwater (T.K. Shrestha) |
| 17:40 | Mahaseer Breeding and Conservation and Possibility of Commercial Culture (S.N. Ogale) |
| **19:00** | **Dinner** |
| **12/07/2001** | |
| **Session-5** | **Chairman : Dr. N. C. Dutta, Calcutta University, India.** |
| 8:30 | *Resource Paper Presentation – 3*<br>Coldwater Fisheries Development (Dr. T.K. Shrestha) |
| | *Technical Paper Presentation – 3* |
| 09:00 | Breeding of pond reared golden Sahar (*Tor putitora)* in Pokhara Nepal (T.B. Gurung et al.) |
| 09:20 | Domestication of wild golden Mahaseer (Sahar) and hatchery operation (P.L. Joshi et al.) |
| 09:40 | Environmentally Sound Aquaculture with Indigenous Fish species (Vibol Ouk) |
| 10:00 | Tea Break |
| **Session 6** | **Chairman: Mr. Naruepon Sukumasavin, Department of Fisheries, Thailand** |
| 10:50 | Double Spawning of Rainbow trout (*Oncorhynchus mykiss)* brood stock in a year using photoperiod change and GnRH hormone (Yadollah Mehrabi) |
| 11:10 | Breeding and Nursing of Asiatic Shovel – nose catfish, *Aoriichthys seenghala* (Sykes, 1841) (Wisanuporn Ratanatrivong , Niwat Anurakchanachai & Paiboon Rungpiboonsophit) |
| 11:30 | Management & Preservation of the giant fish species of the Mekong (Vibol Ouk) |
| 11:50 | Economics of Rainbow trout farming systems in Nepal (A.P. Nepal and et al.) |
| 12:10 | Nutrition, feed and feeding of golden Sahar (*Tor putitora* ) for demestication in Nepal (J.D. Bista and et al) |
| 12:30 | Aquaculture in Trans-Himalayan: Prospect of High Density Mixed Culture of fish with low cost Diets (M. A. Hossain) |
| 12:50 | Present status of Snow trout in Nepal (A. K. Rai et al.) |

| **Date/Time** | **Activity** |
|---|---|
| 13:10 | Fish Fauna of the Narayani River system and their in impact on the fishermen community in Chitwan Nepal (R. R. Dhital and D. K. Jha) |
| 13:30 | Lunch |
| **Session-7** | **Group Exercise.** |
| 14:00-16:00 | Group – 1 Distribution & Conservation of Coldwater Fishes:<br>Group – 2 Role of Coldwater Fish and Fisheries in the Socio-Economic in the Rural Upliftment:<br>Group – 3 Coldwater Fisheries Development: |
| **16:00** | **Tea Break** |
| 16:50 | Group Exercise continued and draft recommendation |
| 13/07/2001 | |
| ***Sesion-8*** | ***Plennary Session***<br>**Chairman: Mr. Pedro Bueno, NACA Coordinator** |
| 08:30 | Presentation and discussion of Group reports |
| **10:30** | **Tea Break** |
| 11:00-13:00 | Summaries the Group Recommendations for Final Presentation |
| **13:00** | **Lunch** |
| 14:00-16:00 | Report Drafting for Final Presentation<br>Preparation for final presentation in groups |
| 16:00-18:00 | Symposium Closing Session<br>***Chief Guest***<br>Mr. Ratneshwar Lal Kayastha<br>*Secretary, Ministry of Agriculture and Cooperatives, HMG Nepal and*<br>***Chairman Symposium Organising Committee***<br>***Summary of the Symposium and Adoption of the Recommendation***<br>Dr. Deep B. Swar<br>*Programme Director, DOFD HMG Nepal, and*<br>*Member-Secretary, Symposium Organising Committee*<br>***Few Words***<br>Mr. Pedro Bueno, *NACA Coordinator*<br>***Few Words***<br>Dr. Devin Bartley<br>*Senior Fishery resources Officer, FAO Rome*<br>***Concluding Remarks***<br>*Secretary, Ministry of Agriculture and Cooperatives, HMG Nepal and*<br>*Chairman, Symposium Organising Committee*<br>***Remarks*** |
| **18:00** | **Dinner** |

***Annex 4-3***

## Speech

### Mr. Ratneshwar Lal Kayastha,
### Secretary of Agriculture and Cooperatives HMG/Nepal and
### Chairman, Symposium Organising committee

Honorable Chairman, Minister of Agriculture and Cooperatives, Rt. Honorable Chief Guest, The Prime Minister, Distinguished Guests, Participants, Ladies and Gentlemen!

It is a great pleasure for me to welcome you to this Inaugural Session of "Symposium on Coldwater fishes in the Trans-Himalayan Region". It is our distinct privilege to host this symposium especially at a time when we are preparing the basic concept of Tenth Plan. It includes comprehensive action plan to develop inland fisheries and aquaculture, which we believe has the potential to contribute significantly to fish food supply and economic well being of our rural people.

We are aware that aquaculture and fisheries enhancement in our region are forging ahead and that significant strides in development of technology backed by extension and investment support have raised production levels with excellent output. However, the sustainability of capture fisheries requires us to improve the conservation and management of fish stocks. It is therefore a pressing need for us to collectively assist the conservation and wise use of our fishery resources, so that it can contribute more to the improvement of the social and economic status of the people. In this respect we very much appreciate the work of FAO, NACA, IUCN, Nepal Fisheries Society and WWF in particular, their support in organizing this symposium. I am confident that this symposium will offer an opportunity to fisheries experts, entrepreneurs, planers and fish farmers of Trans-Himalayan Region to address the major issues confronting us and find the common ways and means for sustainable development of coldwater fishes in the region.

I am very grateful to our Chief Guest, Rt. Hon. Giriga Prasad Koirala, The Prime Minister for accepting our invitation and gracing this occasion which has added immense importance to this occasion. I warmly welcome Rt. Hon. The Prime Minister.

I also would like to welcome Hon. Chakra Prasad Bastola, Minister of Agriculture and Cooperatives for chairing this session. He has been the driving force in enhancing the fisheries performance of agricultural sector including in Nepal. We are very much pleased to welcome our foreign delegates for accepting our invitation to this importance occasion. Their presence is a great encouragement to us.

I wish to extend a warm welcome to distinguished participants and representatives of collaborating organizations and donor agencies.

I wish the Symposium on **"Coldwater fishes in the Trans-Himalayan Region"** all success and wish the participants from abroad enjoyable stay in Kathmandu.

Thanks.

***Annex 4-4***

## Speech

**Dr. Deep B. Swar,**
**Programme Director, Directorate of Fisheries Development, HMG/Nepal and**
**Member-Secretary of the Symposium Organizing Committee**

Hon'ble Chairman the Minister of Agriculture and Cooperatives, Rt. Hon'ble Chief Guest the Prime Minister, Distinguished Guests, Participants, Ladies and Gentlemen!

It is indeed an honour for me to welcome you all and present a brief overview of the Symposium.

It was in Bangkok in February 2000, during the World Conference on "Aquaculture in the 3rd Millennium", that the idea of hosting a regional meeting on fishes in the Trans-Himalayan Region was conceived in consultation with FAO and NACA experts. The holding of such a meet offered great possibilities for common efforts to realize to some extent the vast potential of this rich and diverse Region for the prosperity of its people. And today, after about 17 months, the hosting of this Symposium has seen the realization of that "dream", made possible with the full support of His Majesty's Government of Nepal, Nepal Agriculture Research Council, FAO, NACA, IUCN, WWF and the Nepal Fisheries Society. I would like in the first place to take this occasion to express our immense gratitude for the support extended and contributions made by them. We also seek their continued and active commitment in the future.

Symbolically, this historic Symposium is the beginning of the process of collaboration amongst countries of this Region to develop fisheries for the benefit and betterment of the populace. The holding of this Symposium shows that all the participants have a deep sense of responsibility for development of fisheries and is in itself an important contributor to the building up of our collaboration. The forum is there to identify collective actions needed to further promote understanding and build confidence among the countries of the Region in development of this vital sector. And this is an encouraging sign for the future. I am grateful that so many participants have been able to assemble for this important event.

The native and exotic fishes in the Himalayan Region contribute to livelihoods of the rural population in the mountainous region and also play a positive role in maintaining a balanced aquatic environment in the region. Indigenous species are an important component of the region's biodiversity; they are of high academic value and valuable as genetic resources of the future. Unfortunately, these fishes are threatened by environmental degradation and human activities triggering an urgent need for consolidated regional efforts for the conservation, development and implementation of plans for effective use of the species for improvement of rural livelihoods.

Currently, some individual countries have attempted to collate information regarding exploitation, breeding and status of such species, but there has not been any coordinated regional effort. As the watersheds inhabited by the more important species are shared by a number of nations, a regional cooperative effort is necessary to share experiences and initiate collective actions to conserve and manage these shared aquatic resources.

This Symposium, an initial effort to address some pertinent issues, like sharing experiences on different aspect of coldwater fishes and formulate strategies for future conservation and their sustainable use including opportunities for regional cooperation and collaboration among Trans-Himalayan countries.

I would like now to present brief information on the procedures for the Symposium.

The Symposium is designed to consolidate information, experiences, ideas and findings related to occurrence, exploitation intensity, environmental impacts, conservation measures and cultivation technology of indigenous and exotic coldwater fishes found in the region. Right after the inaugural ceremony, a half-day field trip has been organized to observe ongoing activity on coldwater fisheries in Nepal. The technical sessions will start from tomorrow.

Participant from each participating country will present a country status paper on coldwater fish. There will be overview presentations on regional perspectives to get an insight into the present status of coldwater fishes and future prospects. Three special resource papers will be presented to highlight the current situation of coldwater fishes in the Trans-Himalayan Region and prospects of their utilization in the future. Research paper wills follow after the presentation of relevant resource papers.

Plenary presentations will be followed by discussions on thematic areas through working groups to provide more sharply focused examination of critical issues and proposed solutions. The following broad areas have been identified for discussions:

1: Occurrence and conservation of hill stream fishes, including indigenous and exotic species.

2: Role of Coldwater fishes in livelihoods, socio-economics and environmental balance.

3: Commercial farming of cold water species.

The working groups will give special attention to the development of elements of action plans in their specific subject areas for follow up. The Symposium will come out with a declaration inclusive of draft action plans and list of recommendations for future actions with regard to the development of the fisheries and aquaculture sector in Nepal and in the Trans-Himalayan Region.

I believe this Symposium would give us an opportunity to start working more closely together in the regional sprit in order to achieve common goals and help establish future directions for our work in this sector identifying and charting the course of future actions to meet the challenges and exploit the opportunities in the third millennium offered by our abundant resources. The Symposium will certainly enhance regional networking for better management of the fisheries resources and provide us with an opportunity to map out priorities for this crucial sector.

To conclude, I would like to express the hope that this Symposium will be a new milestone in the process of strengthening cooperation and collaboration for fisheries development between the countries of the Region. I sincerely hope that you will find participating in the Symposium interesting and fruitful. I am confident you will participate actively in the forthcoming discussions.

Thank you.

***Annex 4-5***

## Speech

**Mr. Pedro Bueno,**
**NACA Coordinator, Bangkok, Thailand**

Right Honorable Prime Minister G.P. Koirala; Honorable Minister of Agriculture and Cooperatives, Mr C.P. Bastola; Mr R.L. Kayastha, Secretary of the Agriculture and Cooperatives Ministry; Mr Winston Rudder of the UN FAO mission in the Kingdom of Nepal; Dr Devin Bartley of FAO's Inland Fisheries and Aquaculture Service. Mr Dhruva Joshi, Executive Director of the Nepal Agriculture Research Council; Dr Deep Swar, Governing Council Member of Nepal to NACA; distinguished delegates to this symposium, guests, colleagues and friends; good morning and Namaste.

There are three of us from the NACA Secretariat (Dr Melba Reantaso who is in charge of the regional programme on aquatic animal health, and Dr. Michael Phillips who is NACA's environmental specialist and I). We are honored and privileged to be here and take part in this Symposium. It is a good occasion to meet old friends and make new ones, and work with colleagues and others in the NACA family. I wish however that I were saying these words during more cheerful times in the Kingdom.

On behalf of the NACA Organization, I also welcome you to this groundbreaking symposium. NACA is privileged to be part of this exercise. And we are pleased to see a wide interest and representation from countries, organizations, and numerous stakeholder groups, especially from this Kingdom NACA would like to commend Dr Deep Swar and his team; they have worked long and hard to prepare this meeting and get it going. We appreciate very much FAO's material and intellectual inputs to the meeting. The symposium was hatched Dr Deep Swar and Dr Sena De Silva ( another Friend of NACA) at the Asian Regional Planning Exercise that NACA organized in Thailand in September 1999. Its focus was sharpened and the idea took concrete shape by subsequent consultations between Dr Devin Bartley of FAO's Inland Fisheries and Aquaculture Service and Dr Deep Swar and his colleagues as well as with FAO veterans notably Dr Rajbanshi and Dr Tomi Petr who generously continue to lend their vast and long experience to the development of Asian fisheries.

This broad-based participation is especially encouraging. Because – with the urging and guidance of its Governing Council NACA has of late pursued vigorously the objective of engaging all legitimate stakeholders in aquaculture development. If I may try to convert this Council directive into a statement of principle, it would be that "If NACA did not involve the active participation of each and every stakeholder in its efforts to develop society through aquaculture, it would be short-changing the governments and people". This is long and inelegant and we will appreciate suggestions to recast this statement of purpose into NACA's mantra for cooperation in service to the people of the region.

Cooperation among countries has been the bedrock of NACA's success while collaboration with other organizations has provided strong support to the programmes and wider spread of their results. It is commendable that Nepal has been active in pushing forward this spirit of technical cooperation among countries. Honorable Prime Minister, NACA wishes to acknowledge Nepal's contribution to the spirit of technical cooperation. Nepal is a founding member of NACA and has been a steady and strong proponent of the spirit of regional cooperation.

At the programme level NACA has mustered a broad-based cooperation. This can be illustrated by two examples: The first is the 21-country, multi-organisation regional project on responsible movement of aquatic species, a hugely successful activity that has improved the overall regional but especially national capabilities to safeguard the health of their fish-farming sector. The second is the Support to Regional Aquatic Resources Management. This initiative – called by its abbreviation, STREAM, seeks to enhance the lives of the poor people dependent on aquatic systems for livelihoods. STREAM is the core of NACA's rural development programme. Mr. Prime Minister, I am very pleased to report that Nepal, along with three other countries, has been chosen to be the site of initial STREAM activities. STREAM is an open platform that allows a wide participation among organizations concerned with improving the lives of the rural poor.

On the other hand, while a broad participation is necessary to bring together the intellectual resources to develop and operate a programme, no programme would prosper without the political will to power it

forward. For this reason, I find great encouragement and inspiration in the keen interest shown by the highest level of leadership in his Majesty's Government. Your honor, I wish to place on record the deep appreciation of NACA for your graciously lending your inspirational presence – despite your undoubtedly crowded schedule -- and for strongly signaling your support and the government's commitment to this programme. This expression of support from a very high and esteemed national leader such as you, Your Honor, will surely draw more cooperation.

In this connection, I would like to briefly report on a very recently held meeting, the results of which shall provide a strong research support to the actions expected to follow from this symposium. I have just come from a regional exercise to set agricultural research priorities in South and West Asia held at the ICRISAT's headquarters in Hyderabad. It was convened by the Asia-Pacific Association of Agricultural Research Institutions (of which your own Mr Dhruva Joshi of the Nepal Agricultural Research Council is the Chairman). Two of the high research priorities identified for the hills agro-ecological ecosystems is aquaculture and the conservation and utilization of biodiversity. The Executive Secretary of APAARI conveys their wish to partner us – in a supportive and complementary manner -- to move forward the recommendations of this Symposium. Understandably, the priorities for agricultural research embrace a broader range of issues than aquatic animal biodiversity. They include the non-living resource base of the hilly regions, the plants, livestock, and invertebrate animals (there was a very interesting emphasis on medicinal plants and honey bees), the microbes, the animal life forms other than aquatic. And the fundamental resource bases – water and soils. Incidentally, I have just seen a GIS map of South and West Asia ominously showing that the soils of the upland and hilly regions of most of the Hindu Kush and Trans-Himalayan ranges are moderately to highly degraded. Still and all - whether APAARI, FAO, NACA, IUCN, Farmers Groups, Fisheries Societies, WWF, UNDP, ICIMOD, and others -- our common interests in looking at the hilly lands ecosystem must inevitably converge on the people..

The hilly lands are the most fragile of ecosystems. Fragile as they are, the forests and the hills have been and shall continue to mother agriculture. And, delicate as it is, the ecosystem of the hills is extremely complex. Beneath that green canopy can be a rich and vibrant web of life. However, it only takes a little misplaced or irresponsible pressure on one strand to unravel this web. Unfortunately, it has been done so many times.

The cause and object of this complexity is people. In all regions of the developing world, the landscape where a significant number of the poorest people live are the hills. The chronic human poverty in the highlands is an ironic contrast to the rich diversity in the hills. This then is the challenge to this workshop: to keep our focus on the people while applying scientific expertise to analyse the linkages of aquatic life with the rest of the parts of the ecosystem; to be passionately for their welfare while maintaining a scientific objectivity on the fish and other water species.

The poor people have been accused of inflicting irreparable damage on the hills. I will not debate the validity of this charge. But I will maintain that while people can indeed be part of a problem, they do – except in extremely rare cases of depravity – prefer to be part of the solution. This symposium should thus define ways and means by which we can work together in applying -- in a collective and efficiently coordinated way -- the tools and methodologies of science, and the combined resources of our institutions and governments to uplift the lives of the poor people in the hills – but with their own solutions and participation, not from outsiders' diktat.

Their lives will be uplifted if the floors of the forests continue to teem with life, if the living things that can be used as food (such as fish ) continue to flourish, if those green mansions do not crumble into grey deserts. Come to think of it, ladies and gentlemen it will also uplift the lives of the rest of us, no matter where we dwell.

I share your wish for a stimulating meeting, excellent results, and innovative and practical recommendations. Good morning.

***Annex 4-6***

## Speech

### Mr. Winston R. Rudder,
### FAO Representative, Kathmandu

Chairperson, Hon. Chakra Prasad Bastola, Minister of Agriculture and Cooperatives; Chief Guest, Rt. Hon. Girija Prasad Koirala, Prime Minister; Assistant Minister; MPs; Participants; Distiguished Guests; Ladies Gentlemen; Colleagues.

On behalf of the Food and Agriculture Organisation of the United Nations, I am grateful for the opportunity to make a few remarks at this inaugural ceremony of the Symposium on Coldwater Fishes in the Trans Himalayan Region.

FAO's remit covers, inter alia, the areas of food security, fisheries and rural development. The Organisation's mandate, experience and reservoir of expertise make it a suitable partner in an enterprise of this nature which seeks to identify and elaborate on strategies relating to the bio-diversity, conservation and sustainable development of the fisheries resources of the coldwaters of the Trans Himalayan Region. It is a containing expression of our commitment to support fisheries development globally.

FAO is understandably pleased to join with HMG and the many other parties as co-organiser of, and actively participate in, this event which brings together researchers, planners, academics, entrepreneurs, decision-makers and development workers from the region in the search for appropriate strategies and viable solutions for intervening in this areas of development.

Many imperatives drive the initiative that we launch here in Kathmandu today. Perhaps the most fundamental is a genuine concern for the welfare and well-being of the people of the Region, inspired by an interpretation of development as enlargening their choices and options and increasing their access to and control over the resources to enable them to effect such choice. This perspective challenges us to incorporate into the assessments we make, the policies and strategies we formulate and the plans we implement, the complex phenomenon of sustainability: in particular issues arising form the interface between humankind and the natural resource base.

The third issue of FAO's State of the World Fisheries and Aquaculture 2000 underscores the increasing interest in ecosystems and the impact that to marine ecosystems. For available data indicate that while rivers, lakes and wetlands account for less than 1 percent of the global surface area, they yield at least 8 percent of global fisheries production. The Report notes too that these productive ecosystems are under pressure from the needs of a growing human population and observes that, in particular; the condition of inland water ecosystems is continuing to deteriorate in much of the world.

Accordingly it would be prudent that, in the circumstances, this Symposium import such concerns into its deliberations.

The Trans Himalayan Region constitutes fragile ecosystems, has global significance as repositories of rich bio-diversity, deservedly earns the reputation for spectacular eco-tourism and harbours tremendous water resources. But the Region is also home to too many of the world's malnourished and food insecure.

In this context, the challenge is not to bemoan the inhospitable environment, but rather to assiduously apply the wit and intelligence with which we are generously endowed in generating ideas and creating opportunities to improve the well-being of the people of the Region. I submit that this vision and approach constitute a defining difference between whether a people attain the state of development or remain in the developing mode. It is important, however, that as agents of change, even as we bring our scientific knowledge, understanding and value the knowledge and contribution of the people and communities themselves for they often have insights beyond our conception.

It is to be hoped that the initiative we launch in Kathmandu today leads to an expanded network of cooperating individuals, Institutions and hopefully governments, committed to the task of sustainably developing the coldwater fisheries resources not only for the benefit of the people of the Trans

Himalayan Region but the result of humanity as well. Conceivably the concerns of this enterprise, which embrace ensuring the ecological integrity and socio-economic viability of the Region, also fit the objectives of IYM to be observed in 2002. Accordingly the Symposium offers a unique opportunity to generate ideas which can effectively contribute to the package of proposals for reinforcing long-term mountain development and conservation efforts-a major aim of IYM.

May I wish you all success in your deliberations over the next four days and thank you once more for the opportunity of sharing at this inaugural ceremony

***Annex 4-7***

## Speech

### Mr. Girija Prasad Koirala,
### Rt. Hon'ble Prime Minister of Nepal

**Mr. Chairman,**

**Participants,**

**Experts and Resource Persons,**

**Ladies and Gentleman.**

I am happy to inaugurate this Regional Symposium on **"Cold Water Fishes in the Trans – Himalayan Region".** I am delighted that this event is taking place at a time of greater need for awareness regarding fisheries amongst the people in the rural areas of Nepal and the region. We have taken this symposium as a special event and hope that it will contribute to the celebration of the International year on Mountains.

This is the first occasion that Nepal is having the privilege of hosting s symposium in this subject. It will give us opportunity to share our experience and development with others in the region and beyond. Conferences like this will allow the professionals in the field to exchange, debate and share their research and knowledge. This will in-turn facilitate the policy formulation and implementation.

The Trans-Himalayan Region possesses enormous water resources potential. Nepal, a landlocked country, is endowed with enormous natural water resources flowing from the Himalayans in the form of rivers, lakes, and reservoirs, which need to be harnessed optimally with a view to accelerate economic growth in a sustained and equitable manner. Nepal urges all the concerned parties, participants, as well as experts and professionals, to direct their effort for overall development of commercially important indigenous and exotic fish species not only in Nepal, but also in the region.

Ladies and Gentleman, I should like to emphasize the responsibility of all concerned Governments and institutions of this Trans-Himalayan Region to help to exchange information concerning various issues related to indigenous fish species in the rivers, lakes, and reservoirs. This will help the countries of the region to monitor and speed up the progress in this field. I am confident that the symposium will make an important contribution towards meeting this end.

I wish all the foreign participants and guests a comfortable and memorable stay in Kathmandu and hope that this will be a successful meeting.

Thank you.

***Annex 4-8***

## Speech

### Mr. Chakra Prasad Bastola,
### Hon'ble Minister of Agriculture and Cooperatives, HMG/Nepal

Chief Guest the Rt. Honourable Prime Minister, Distinguished Guests, Participants, Ladies and Gentlemen!

I feel greatly privileged to be given the opportunity to chair the inauguration ceremony and address this historic Symposium on "Coldwater fishes in the Trans-Himalayan Region". We are encouraged and feel pleased by your presence in this important event which will help a lot in shaping our common future in this sector. The time to focus on the issue of tackling common challenges in the development of fisheries and aquaculture with a genuine partnership has long been overdue. We are all eager to make our contributions working together to build a better future with a clear vision and pragmatic achievable approaches.

Nepal is blessed with vast freshwater resources in its multitude of rivers flowing down the Himalayas. Our lakes, reservoirs and low-lying wetlands provide added opportunities for fish culture. Unfortunately, Nepal has not been able to take advantage of this wealth because of various constraints. Of Nepal's about one million hectares available aquatic surface area suitable for fisheries and aquaculture development, less than one percent (1%) is being utilized till date. Similar conditions exist in other countries in the Region. Though the countries in the Trans-Himalayan Region have abundant natural as well as human resources, our people have not benefited due to lack of capital, technology and know-how. Efforts are overdue to expedite our development and to address the problems found in drawing effective benefits.

Ladies and Gentlemen, His Majesty's Government of Nepal has been promoting fisheries and aquaculture in ponds, lakes, reservoirs and rivers for almost five decades now. We consider fisheries and aquaculture extremely vital in fulfilling Nepal's nutritional and food security requirements. Considering its importance, HMG has embarked on the formulation of its Fisheries Perspective Plan (FPP) to ensure the availability of animal protein for our growing urban and rural population in the third millennium. We consider holding of this Symposium on Coldwater fishes in the Trans-Himalayan Region timely and important as our own fishers are facing various problems due to adverse impact of several human activities and environmental degradation. I understand that such activities are likewise posing a great threat to cold fisheries and aquaculture in the Asia-Pacific region.

I hope that open and frank exchange of views and intense discussions on meaningful ways and means to develop cold water fisheries and aquaculture will be forthcoming in this Symposium to enable us to move forward rapidly in formulating appropriate and sustainable plans, policies and actions. And that sharing of knowledge and experiences will be enhanced to identify promising opportunities and prospects in this sector for development. Please be assured that the Government will follow your deliberations and discussions in the Symposium with great interest as we seek to learn from experts and specialists the possible solutions to similar problems confronting our fishermen. I am sure that our economists, planner and fisheries experts, who are in the process of finalizing concept of the Tenth Plan of Nepal, will seriously consider the conclusions and recommendations of this Symposium. I am confident that the outcome of this regional symposium will contribute towards resolving the problems faced by the numerous fishermen not only in Nepal, but, also in the Asia -Pacific region in general.

We are grateful to the donors, organizations and the international community and sponsors for our endeavors so far and for making possible the hosting of this Symposium, an initial step towards a long-term collaboration in the field of coldwater fish and fisheries development on a regional basis. We feel the need for continued initiation related to exchange of information and holding of seminars aimed at enhancing dialogue and exchange of ideas from within and outside the Region to develop a comprehensive and balanced approach in order to address the common concerns and strengthen cooperation. We appeal for your continued support and assistance so that we can forge ahead meaningfully to create and sustain an enabling environment in this sector to promote economic

development and poverty alleviation. We need to build on the fruits of this momentous occasion. It is important that the institutional capacities of concerned regional organizations need to be strengthened to enable them to play significant roles in fulfilling the regional objectives. His Majesty's Government of Nepal stands ready and willing to actively participate and contribute in this essential effort.

On behalf of HMG, I wish to express my sincere gratitude to the guests, experts and resource persons gathered here today. I am sure that our national scientists and technicians would greatly benefit from your experience and knowledge about coldwater fisheries.

I wish you all great success and an enjoyable stay in our wonderful Himalayan Valley of Kathmandu.

Thank you very much.

***Annex 4-9***

## Speech

### Mr. Dhruva Joshy,
### Executive Director, Nepal Agricultural Research Council (NARC)

**Hon'ble Chairperson, Minister of Agriculture and Cooperatives**

Chief Guest Rt. Hon'ble the Prime Minister

Delegates from different countries of the region

Distinguished Guests

Ladies and Gentlemen

The inaugural function is a gratifying and rewarding day for all of us. It is indeed, a day of fulfillment of the cherished desire to host this Symposium on Cold Water Fishes in the Trans-Himalayan Region, which will provide an insight into the present status of cold water fishes and future prospects on sustainable use of these indigenous resources in relation to the conservation of the region's aquatic biodiversity.

Rt. Hon'ble the Prime Minister, we are grateful to you for finding the time, despite your busy schedule, to be with us, to inaugurate this Symposium and address this gathering. I am sure; your address will provide us with inspiration, practical wisdom, guidance and support.

May I also take this opportunity to extend our sincere gratitude to the Hon'ble Minister of Agriculture and Cooperatives for accepting our invitation to chair the inaugural session and delivering invaluable chairperson's remark. You have very rightly pointed out that our fishes are under threat due to human activities and environmental degradation. Environmental problems are essentially social problems and such social problems begin with man as the cause and end with man as the victim. This alarming phrase has underlined the urgency of research for practical solutions to the basic problem of environmental degradation.

We are also thankful to the secretary of Ministry of Agriculture and Cooperatives for giving valuable suggestions as the chairman of the organizing committee of this symposium and bringing the symposium to this stage.

I would also like to place on record our sincere thanks to the then secretary of agriculture and cooperatives and now the secretary of environment and population Dr. Mukti Narayan Shrestha for his meticulous spadework, without which this symposium of this scale would not have been possible.

I wish to extend my sincere thanks to the governments of the region and organizations who have honored us by sending their delegates in response to our invitation. This action by the governments, I hope, indicates their concern and exemplifies the forum of cooperation this symposium can become.

It may not be out of place to record our gratitude to FAO, NACA, IUCN, WWF, NEFIS and HARP for their generous support they have extended to the symposium through various ways.

Last, but not the least, I would like to thank all the members of the organizing committee and others who have contributed to the making of this event possible.

I would also like to add from my side, distinguished guests, ladies and gentlemen, that your presence at this occasion is a source of encouragement. It is a reassurance for us that we are engaged in a worthy cause.

Thank you ladies and gentlemen, for responding to our invitation and participating in the inaugural function.

Thank you once again and have a Good morning.