8. LESSONS LEARNED AND CONCLUSIONS

Given the high population density and vulnerability to climate shocks, recent history of famine and past experiences and dependency of agriculture for livelihoods, Bangladesh is further threatened by the impacts of future climate change. Already half of the population live below the upper poverty line (2 122 k cal/day) and a third below the lower poverty line (1 805 kcal/day). Poverty alleviation and ensuring household level food security under changing climate conditions is a major challenge. Ensuring community participation in climate change adaptation, in addition to top down institutional development and policy support is crucial to manage the future risks at community level in general and for the agriculture sector in particular. The key lessons and conclusions drawn from the project implemented by FAO to promote livelihood adaptation to climate change in drought prone areas of Bangladesh are:

Launch adaptation with a focus on current variability and factor in climate change: Where climatic factors are unfavorable and natural disasters strike regularly, livelihoods are increasingly vulnerable, especially due to the inadequate local capacities and limited access to various livelihood assets and or services. Regardless of its underlying causes, climate change is changing disaster risk profiles, environmental and socioeconomic vulnerabilities and induces new environmental hazards that further impact development processes. Impacts caused by altered frequencies and intensities of extreme weather and climate phenomena are very likely to change. However, the experiences of the recent past, current living conditions and natural hazard threats is what prevails in peoples' memory, thus making present natural hazard threats and climate variability the best entry points for community-level interventions, awareness raising and advocacy towards climate change issues. The initiatives of integrating climate change adaptation into the DRM operational frameworks had helped to identify locally relevant adaptation practices for current and future drought risks, and this project demonstrated their availability for possible replication under changing climatic conditions in the future.

Climate adaptation is a social learning process that creates the capacity to cope with climate change related impacts. Since we are not yet able to anticipate exact climate impacts in the future and particularly not at local scale, the project suggests that the intermediate goal of climate change adaptation programmes should be to empower communities to be able to adapt well given the impacts on broader ecosystem perspective. In pursuing this goal, climate adaptation should focus on support for the decision-making and capacity building processes that shape social learning, technology transfer, innovations and development pathways. This process of adaptation needs to explicitly address the needs of marginalized groups that are most vulnerable to the types of climatic and socio-economic changes that are likely under perturbed climates. The social learning process need to identify the best practices through participatory processes for community based adaptation. A key message is that the current uncertainty regarding the precise impacts of climate change should not be used to justify inaction.

Multiple and integrated adaptation measures across sectors are essential: Project findings confirm that climatic conditions and anthropogenic factors mutually reinforce chronic vulnerability to climate variability and natural disasters. Technology, on its own,[4] is at best a partial solution to climate change and technological solutions should be embedded in the relevant social and environmental contexts. The project confirms the need for multiple but integrated pathways across sectors to improve adaptive responses of local communities

[4] Example: *We successfully tested water savings technologies in irrigated rice production. 20 % water savings, same yields. But Farmers tell us they are not going to adopt these practices at present, because water supply for irrigation depends on electricity and there are too frequent electricity failures. The risk for them to loose the crop with less time flexibility for watering - which the techniques imply- is too high. It shows that our improved AG technologies* ***alone*** *are not sufficient*

especially the poorest sectors of the community. Neither an agricultural nor any other single sectoral intervention alone can provide sufficient scope to manage the future anticipated risks expected by climate change. Short-term and long-term adaptive measures in agriculture, linked with clear focus on possible future risks, must be integrated into cross sectoral planning including:

- physical adaptive measures (e.g. link canals, irrigation, storage facilities for retaining water; drainage);
- adjustment of existing agricultural practices to match future anticipated risks (e.g. adjustment of cropping pattern, selection of adapted varieties of crops; diversification of cropping and/or farming systems; better storage of seeds and fodder; dry seed beds; switch to alternative crops; more efficient use of irrigation water on rice paddies; more efficient use of nitrogen application on cultivated fields; improved water management including water harvesting);
- Introducing alternative enterprises/farming systems (e.g. adoption of mango or Jujubi as cash crop, goat rearing and poultry production; pulses as additional crop after monsoon season), more agroforestry
- socio-economic adjustments (livelihood diversification, market facilitation etc.,);
- strengthening of community resilience, including local institutions and self-help capacities;
- strengthening of formal institutional structures and environment;
- policy formulation to catalyze enhancement of adaptive livelihood opportunities;
- awareness creation and advocacy on DRM, linking it with climate change and adaptation issues;

Adaptation to climate change is a location specific issue. There will be no "one fits all" solutions at local level. Decentralized ways of working are needed, within the framework of coherent national policies. Project demonstrations such as mini-ponds show that it is a good adaptation practice for a farmer who is operating on a clayey soil, but not suitable for a farmer who is operating on a sandy soil. Specific attention is required to develop location specific adaptation options to manage future anticipated risks considering bio-physical, socio-economic and socio-cultural factors.

Institutional capacity building and organisational networking with clear definitions of roles and responsibilities are essential: In order to make adaptation work, institutional capacity building and strengthening of organizational networks across all levels and sectors is a basic precondition. Since adaptation (to climate change) is a new field of work, the institutional responsibilities are not yet well defined. When doing so, there will be the need to carefully integrate top-down and bottom-up perspectives and capacities, and to establish 'functional coordination' mechanisms between various agency activities, planning, communication, and operations at field level. Furthermore, it will be crucial to better link and factor-in adaptation to other on-going development activities, and to determine clear roles, who should do what in order to make community based adaptation effective. The experiences clearly showed that provision of a comprehensive approach with concrete roles for action is necessary to motivate change in local perceptions and ensuring meaningful interventions through local service providers including government institutions. The project implementation process showed that a lot can actually be achieved if we get the full buy in, and can work though the existing institutions.

Applying a livelihoods perspective is helpful to understand and promote local level adaptation to climate change: Community and household assets are influenced by the institutions, organizations, policies and legislation that shape livelihoods. The institutions and processes operating from the household to the national level and in all spheres, from private to public, determine access to assets, livelihood strategies and vulnerability to climate change. To add climate change adaptation through a livelihood perspective helped

improving the adaptive capacity of farmers by increasing household access to assets and services. The creation of broad awareness of climate variability at grassroots level, through government and non-governmental interventions and the provision of essential support such as information, technology, technical know-how, alternative sources of income and employment, credit facilities, insurance mechanisms, health facilities and information on markets, as well as dissemination of all awareness messages in local language need to become an integral part of the livelihood adaptation process. The livelihood perspective was strengthened by the initial scoping studies and the better understanding of local community perceptions on risks and local coping and adaptation practices.

Need to better promote sustainable natural resource management practices in the context of future risks. The project shows that we can reach pretty far in terms of awareness raising and capacity building for adaptation, if we would succeed first of all in doing better what we already know about sustainable natural resource management and agricultural development. There is already wealth of knowledge on sustainable technologies and innovative methods of technology transfer to manage current risks. Tuning these risk management techniques towards future anticipated risks could address the future risks to a significant extent. By taking this first step we can gain a time window urgently needed to get better. Locally down-scaled predictions of climate change impacts and new location specific adaptation options will then build on what is already practiced by the farmers or existing at the technology transfer mode.

Need to revitalize and strengthen research and development links; The project experience argues in favor of establishing more and better - participatory practical learning and action research and development platforms to jointly develop and replicate with farmers, Departments of Agriculture and international and national research institutions innovative adaptive technologies. Emphasis should be given on demand driven, interactive research based on mutual learning between farmers such as through farmers field schools. project helped to identify the current weaknesses in the institutional set-up, networking and information sharing. The weaknesses had been partially addressed through strengthening existing institution's technical capacity and by promoting new structional coordination and collaboration mechanisms..

There is a need to monitor ongoing adaptation practices, alert on risks of mal-adaptation, and establish links with policy making. Farmers do take action anyway on their own if they can, irrespective of external interventions. It was observed in North West Bangladesh that many land owners started planting Mango trees in their rice fields, mainly for economic gain but also because the mango is well adapted to the increasingly dry conditions . This autonomous adaptation is taking place in an unplanned and uncoordinated manner. However, this is likely to have a negative impact due to shading on the rice crop underneath in 2-3 years time. Once the land is not suitable for rice production, local food production and availability will then go down, the landless laborers will lose their work. This may lead to internal migration in search of employment, which is considered very critical in densely populated areas and towns like they exist in Bangladesh. The project tried to present with *Jujubi* and alternative crop to mango, which would not cause the same loss of rice. In general terms however, it is required to start thinking about such developments and need to give answers to questions such as if we can leave adaptation uncontrolled to the market or should governments be more actively involved in analyzing, testing and promoting good adaptation options, with incentives and regulatory frameworks as necessary to prevent mal adaptations?

Assess the value of indigenous knowledge in the context of managing future risks: There are a lot of valuable local practices and indigenous knowledge among the farmers on drought risk management, but it is necessary to assess the real value of these practices in the context of managing future risks. It is required to better assess and promote their

dissemination and integrate them with value added knowledge which may not be locally available. The project-based experience related to involvement of the local research institutions has provided insight into the whole range of issues related to adaptation to drought and designing management alternatives. There are many "domains" like land use planning, watershed management, plant production, farming systems research, developing drought tolerant varieties and small scale water harvesting practices already in place. It is a good entry point to put the existing knowledge about climate risks and working approaches into the new context of climate change adaptation.

The establishment of an institutional framework through which local adaptation strategies can be reviewed, validated and integrated into the mainstream of resource management, however, is essential to improve the adaptive capacity of community in general and farmers in particular. Precise documentation and monitoring of all coping and adaptation strategies followed by farmers is necessary to provide a basis for the future.

Adaptation practices related to crop diversification and income generation are preferred at community level: The results of field demonstrations confirmed that farmers' acceptance of alternative crop diversification (Mango and Ber) and income generation practices (fruit tree nurseries and homestead gardening) are very high. Similarly, acceptance of drought tolerant rice and pulse production was high due to a higher income level and crop intensification. Water saving rice cultivation was less preferred by farmers in areas where irrigation water was supplied through deep tube wells – requires awareness rising efforts and policy interventions on pricing of water in the future. Adoption of dry seed bed and compost was moderate as adoption of these practices requires substantial training at community level. Adaptation practices involving community actions like mini-nursery were highly preferred, as the practice provided substantial income throughout the year. Without net financial benefits for farmers there seems to be little scope for local adaptation of any new technology at this stage.

Promoting public – private partnerships in climate change adaptation: The vulnerable agricultural systems are facing huge environmental and social challenges, in view of potentially harmful effects of climate change. Corporate Social Responsibility (CSR) is a new concept in NW Bangladesh whereby organisations including private enterpreneurs are taking responsibility vis a vis the society for the impacts of their activities on communities and the environment. This obligation is perceived to go beyond the statutory obligation to comply with legislation. Organizations are voluntarily taking further steps to improve livelihood assets of their local community and society at large. During the initial project phase, the private enterprenuers were engaged in the process of developing adaptation practices that increase resilinece against impacts of climate change and maximise the benefits for overal sustainable development. Awareness has been created among the local seedling producers about the advantage of drought resistant species and the project team facilitated the interaction between Department of Agricultural Extension (DAE), local research institutes and private seed/seedling producers.