Presentation on the Strategy Theme
(On-Farm)
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**Introduction**

We are all aware of the state of food security in the world. There are statistics showing that more than a billion of world populations don’t have access to proper food for their survival. Where another billion people are under-nourishment. On the other hand the world food supply is not only insufficient to overcome such a great world hunger, but it is not also well distributed to mitigate such a human threat.

There are certainly a great global potential to increase agricultural production so as to meet the existing gap between the food demand and supply. How this potential can be realized through irrigated and non-irrigated agriculture is the question which many researchers, scientists and organizations have been trying to address during past few decades.

**I) Non Irrigated Agriculture**

Sixty percent of agricultural production is coming from non-irrigated farms covering 1.2 billion hectares of land. We can add to these six billion hectares of natural grass land and pastures which are contributing to human food chain. In spite of such a relatively vast rain fed cultivated and non cultivated area within the human access to be utilized for its welfare, but their contribution to the human food basket is limited. No proportional efforts have been put forward by governments, international agencies, and concerned NGOs to optimize such systems towards food production. Little development has been contemplated to the traditional dry framing during the past half a century, particularly in developing and emerging countries.

The productivity of rainwater so called green water in these regions is relatively low and there are considerable rooms for improvements, which could result great boosts to the world food supply. ICID in coherent with other international agencies, concerned with global food security, should bring the issue within their working
groups activities to play an important role in this endeavor which would certainly contribute to the enhancement of food security and more important to improve livelihoods in rural areas.

The scattered researches show that non irrigated agriculture production particularly the grain production can be doubled or more by better management of rainfall, and some agro-technical improvement. Investments in infrastructures and technology, accompanied by biotechnology enhancement and introducing appropriate seed varieties relative to the prevailing environment would ease the road to such success. The emphasis should be given to the farmers’ awareness, especially within the rural community if any achievement in this respect is to be sustainable.

II) Irrigated Agriculture
The world irrigated agriculture with area covering 18% of cropped land is producing 40 percent of world harvested food crops production.

This demonstrates importance of irrigated agriculture where obviously much attention has been devoted. The expansion of area under irrigation and yield per hectare improvement has been exercised as development plans in many parts of the world during last 50 years. So called green revolution was not totally success, as the achievement in the past has been mainly due to the blue rather than the green revolution. Through which more water resources were developed for irrigation purposes in many countries. It seems we are approaching to the upper limit of global water resources development to be allocated to agriculture, hence limited opportunities are expected for expansion of irrigated farming.

Here also the great potential exist in water productivity enhancement. Apart from the considerable achievement which have been experienced in totally controlled irrigation environment systems such as hydroponics cultivation with very promising
future, but there are still many hopes for improvement within the conventional irrigated agriculture, particularly in developing and socio-economical emerging countries.

Here, ICID as the major NGO focusing on the irrigation and drainage worldwide is facing with a great challenge to demonstrate its capacity to create considerable changes towards more effective irrigation practice in these countries. Our contribution would be through knowledge development and transfer. To do that we have to know the problems and constraints impeding the successful irrigated agriculture in these parts of the world.

There are many different elements with complex natures, which would contribute to the success of crop production and productivity enhancement. As such, biological response of crops to the prevailing environment, human intervenes through agricultural management and practice, using appropriate science and technology, natural and environmental effects and etc… Some of these elements can be manipulated towards higher production by reasonable efforts and investment and some are really time and money consuming and with low impacts on yield improvement, or some remain beyond our control.

ICID working groups under theme ON-FARM can accept the challenge to bring shifts in paradigm of irrigation knowledge and practices related to:

- Basic irrigation principles.
- Appropriate technology.
- Modern irrigation practices.

**a. Irrigation principles and practice**

After more than half century scientific approach to the concept of irrigation practice and management, yet many basic principle of irrigation science remained in
ambiguity. The basic concepts of irrigation such as irrigation water requirement and irrigation efficiencies are now under question.

Potential Evapo-transpiration, which is usually calculated indirectly from meteorological data, is used as an indirect reference for crop water requirement. There are considerable over estimation involved in this transformation due to assumptions made in this context. This includes evaporation from bare land, which is not consumed by crops, the full land coverage by crop canopy, which is not normally the case, and no constraint on availability of moisture for evaporation.

There is also over estimation resulted from using meteorological data which are mainly collected from synoptic weather station, whereas the crop would experience in actual field less temperature at the same circumstance? So less magnitude of evapo transpiration occurs in real world.

Efficiencies are another misconception in irrigation practices. Irrigation water losses are quite a vague concept, depending on the angle and scale which they are looked upon. They differ if considered at farm level or basin wise. There are many irrigation schemes, particularly in semi-arid regions, supplied by groundwater. There may be considerable losses of water due to deep percolation and run off at farm level, which are the main elements of lowering farm irrigation efficiency. But if considering irrigation efficiency at basin level, there may not be any losses at all. In such a basin, any water saving at a particular farm to be used for irrigation expansion, may limit some other ground water users at some points downstream. In other word, losses of water at upstream would be a hopeful resource for downstream water users. So conventional recommendation and approaches for irrigation efficiencies improvement, appeared in many text book and other documents should be reviewed accordingly. Here again ICID can contribute to clarify this ambiguity.
Deficit irrigation approach is another promising management practice to aim water productivity improvement. This concept is related to bio-economical consideration which effectively can reduce the irrigation water requirement even further. There are several published researches demonstrating that the maximum water productivity for grain at farm level would be accomplished at around 50% of conventional irrigation water requirement practice. Our work bodies can orchestrate concerted research actions to provide a guideline for proper technical and managerial approaches to deficit irrigation practice.

Rapid urbanization is a world feature at present. Soon the developing countries would experience 70% of their population living in the cities. A lot of investments have been devoted in the past decades to water conveying systems to the cities and then getting rid of the wastewater thus provided. The treated wastewater is a reliable source of water to be allocated to agriculture, particularly urban Agriculture which is a growing practice within or around the large cities in many parts of the world. In spite of the relatively long history of using wastewater effluent for agricultural purpose, and attempts made by many research and organization in recent years, but there are not yet integrated source books available to provide the users with the appropriate techniques and management practices to consider all socio-economical as well as environmental issues for wastewater reuse. These topics can be within our working group Agenda.

b. Appropriate Technology
There is less than 10% of world irrigated agriculture under modern pressurized irrigation systems and low pressure irrigation distribution systems. More than 50% of sprinkler and micro irrigation systems in the world have been developed in North American and Europe, where high technology plus best management practice have been executed. So we are facing with the situation that the main bulk of world
irrigation systems are surface irrigation systems particularly in developing and socio-economical emerging countries where more than 70% of the world irrigated land exist. It is very important to define the shortcomings and problems which are limiting the boosts in agricultural production in this part of irrigated world.

Technological advancement during the past half century to assist the farmers falling in this category that are characterized mainly with under education, low capacity to invest and obsess by traditional farming has been very little. The basic irrigation knowledge and practices such as when and how much water should be applied in any irrigation application are not being exercised.

There is much indigenous knowledge inherited from their historical management experiences which are actually governing their behavior. They have no access to any source of data providing mechanism or agencies for setting up appropriate irrigation scheduling in their farms. Simple flow measurement device are lacking there. There are usually no automation in operation of their irrigation systems and little technical support they get for their successful performance.

Adding to these handicaps lack of proper education and available funds would limit the environment that any advance technology can make significant impact on crop production increase. In this respect On- Farm activities at ICID can be focused on appropriate and low cost technology development to meet such requirements.

c. Modern Irrigation Practice
It is very unfortunate that after so long history of modern irrigation practice, yet majority of farmers in developing countries are suffering from miss management of their own farm due to their unawareness of proper irrigation knowledge. They do not have capacity to take the risk of change. The low investment and fund raising
capability within such communities and lack of proper institutional back bone would not provide them with opportunities to overcome their gloomy and hopeless life.

It is of course the responsibly of the governments to construct a virtual bridge to transfer the accessible knowledge of irrigation practice to the farmers to improve their livelihood. Presumably the extension services, which are normally designated to act as such a bridge, have limited effectiveness to do so.

ICID as knowledge based NGO should consider this issue as a strategy commitment, and use its capacity through all work bodies to find a way to communicate with the poor end irrigation water users.

If we overview the ICID working group activities we would admit that only very few items within their agenda fall in this category to assist poor farmers, where, ironically great potentials exist for improvement in agricultural production and hence food security worldwide.

The 5th World Water Forum is very appropriate place to raise such issues, I hope ICID can contribute to the Forum actively and take the initiative to comment upon the questions which are already appeared in Forum Agenda and they are quite relevant to the above mentioned arguments.

Knowledge transfer and capacity building targeting rural farmers particularly in developing countries are certainly the key actions, in this regards to be taken by related ICID working groups.

**General Comments on Working Groups under Strategic Theme On-Farm**

- All three work bodies under theme On-Farm, are in the process of revising their mandate, and may be with a new name for working group. Traditionally the working groups would pursue their mandates through proposals which are coming from volunteer members, usually upon their
personal interests. Therefore, WGs are facing with a few topics in their agenda which are not necessarily covering the whole aspects of mandate; hence no clear conclusion would be possible to be realized by the end of WG tenure. Whereas, from the beginning, the work bodies should define the major topics, or package of actions, which could lead them to their anticipated outcomes. Any papers, manual, books, workshops proposed by the members, chairs, and Central Office should then be conceived as a part of such integrated pieces of work towards the final WG outputs.

- The Working Groups should ensure that the outcomes of their respected work bodies as a compiled and enhanced knowledge of agricultural practice at farm level are being effectively disseminated and contemplated by the end users. There are number of work bodies’ products presented as paper which are appeared in the ICID journal, workshop proceeding or elsewhere with very limited accessibility and far reaching to the farmers. To overcome this shortcoming we have to find more appropriate ways of communication and disseminating WGs related outcomes. Preparing Guidelines, Technical bulletin, Code of practice, References book, data bank, etc are the examples for such an approach.

- Working Groups are recommended to pay more attention towards the issues and problems associated with On-farm crop production. These issues should particularly address the encountered difficulties in developing countries, where more than 70% of global irrigated land exists, and the farmers often live with their strong traditions and little access to the appropriate sources of knowledge to improve their livelihood.

- Most WG-On Farm activities are related to the pressurized irrigation systems, whereas the majority of irrigated land worldwide are under
conventional surface irrigation systems. So more attention should be diverted towards surface irrigation systems and new management and technology advances in this respect.

- In spite of conducting several workshops the outputs of these events have not been properly summarized and documented for further consideration. I believe it is an appropriate practice for members of workshop technical committees to provide an executive summary and recommendation for each workshop by the time of its execution. These documents may contain the new findings and approaches to the related topics which can be a base for conducting new researches in target countries.

- The detail activities and time schedules proposed for Working Groups On-Farm, PQW and Water and Crops (CROP), considering the mentioned comments, would be finalized upon the approved new mandates within the defined tenure of respective working group.

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Strategy Theme On-Farm

On-Farm

Poor Quality Water (PQW)

Water and Crops (CROP)
Global Food Insecurity

- Limited access to proper food for survival
- Under nourishment
- Improper food resources distribution

Development of Global Agricultural Potentials

- Non – Irrigated Agriculture
- Irrigated Agriculture
Non-Irrigated Agriculture

- Non-irrigated farming : $1.2 \times 10^9$ Ha.
- Natural grass land and Pasture : $6.10^9$ Ha.
- Little development has been contemplated in dry farming
- Low productivity of rain water

Improvement Can Be Achieved through

- Rainfall management
- Investment in infrastructure and technology
- Biotechnology enhancement
- Farmers awareness
Irrigated Agriculture

- Global land productivity is twice as much as in non-irrigated agriculture
- New water resources development is limited
- Opportunities exist for water productivity enhancement

On-Farm Working Group

- Basic irrigation principles
- Appropriate technology
- Modern irrigation practices
Basic Irrigation Principles

- Potential evapo-transpiration
  - Evaporation from bare land
  - Crop canopy coverage
  - Availability of moisture for evaporation
  - Less evapo-transpiration at field level
- Irrigation efficiencies
  - Scale of consideration
  - Irrigation water losses and ground water recharge

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Basic Irrigation Principles

- Deficit irrigation
  - Biological concept
  - Economical concept
- Urban agriculture
  - Treated wastewater
  - Surface runoff
Approprial Technology

- Pressurized irrigation system
  - Covering less than 10% of world irrigated area
    - More than 50% of pressurized irrigation systems has been developed in North America and Europe.
    - More than 70% of world irrigated land is located in Developing and socio-economical emerging countries

Improvement through

- Providing required data and techniques for simple irrigation scheduling
- Simple flow measurement devices
- Appropriate level of automation
- Technical support
- Financial support
Modern Irrigation Practice

Farmers in developing countries are suffering:
- Lack of proper irrigation knowledge
- Less capacity to accept changes
- Low investment capability
- Lack of institutional structure

Any modernization in irrigation systems should meet these handicaps

ICID
- Adopting related strategies and commitments
- Better communication to the poor end users
- ICID working groups to consider these issues in their agenda
- Active participation in 5th world water forum through relevant activities
Strategic Theme On-Farm

- New mandates are recommended to cover these topics
- Providing road maps to the objectives
- Effective dissemination of WG outcomes
- Focus on On-Farm crop production activities in developing countries
- Giving priorities to surface irrigation
- Best use of workshop outputs

Thank You