INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE (ICID)
Water secure world free of poverty and hunger through sustainable rural development

Working Group on Water for Bio-Energy and Food (WG-BIO-ENERGY)

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CLOSURE REPORT

Background

Global concern about fossil fuel prices and availability, a renewed quest by many countries for energy independence and a widespread concern about reducing greenhouse gas emissions have been the main reasons that both developed and developing nations have looked for alternate energy sources (Tardieu and Schultz 2008). Bioenergy offers many new opportunities, but if not managed correctly can create risks.

Biofuels are transportation or heating fuels derived from biological sources such as grains, sugar crops, starch, cellulosic materials and organic waste. There are two types of biofuels: Bioethanol and biodiesel (*de Fraiture et al. 2008*). Currently 85% of total global biofuel production is ethanol.

Escalating fuel prices and the quest to reduce GHG emissions have triggered interest in the development of biofuels with often positive consequences on agricultural prices at the farm gate. Modern bioenergy represents a new source of demand for farmer's products with the promise of creation of income and employment. This results in more land and resources being devoted to produce these energy crops. It provides an opportunity for some farmers to escape the poverty trap, but that may happen at the expense of food security and environmental integrity. This calls into question the ethics of diverting land, water and crops into energy crops (*UNCTAD 2009*). Simultaneously producing food, feed, fibre and fuel could potentially lead to environmental degradation and over exploitation of water resources. Since the main focus of ICID is on agricultural water management and increasing food production to make the world free of hunger, so the concentration of the study by WG-Bioenergy was on biofuels only. Keeping the above in view, ICID with the support of its selected national committees brought forward this technical paper with the objectives and scope given below.

1.1 Objective and scope of this technical paper

Bio-energy production and use have both positive and negative environmental and socio-economic consequences, including those pertaining to water. Water, which is already a scarce resource in many parts of the world, will come under further stress providing competitive demand on water for food production. The expansion and intensification of bioenergy production could add to existing pressures on land and water management. Therefore, water resources management and adequate policies and strategies are needed to help ensure sustainability and balance different types of use in the short and longer term.

The WG-BIO-ENERGY was originally initiated as a Task Force on Water for Bio-energy and Food (TF-BIO-ENERGY). The mandate of the TF was to evolve a ICID position paper on bio-energy. The position paper would present the collective views of the ICID community on bio-energy production and its impacts on food security. Some of the questions that would be attempted to be answered in the paper are:

1. What is the nexus between bio-energy, water and food production/food security?

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2. How are the production and use of bioenergy products likely to influence the future state of water resources?
3. What are its impacts on agriculture water availability and use?
4. What are the data and tools requirements for making required impact assessments?
5. What are capacity development needs for making better decisions in this respect?
6. How can Irrigation Authorities prepare themselves where such policy decisions are taken by the national governments?
7. How can society mitigate negative impacts of bio-energy production?

This is neither a research paper nor attempted to be a comprehensive state of knowledge document on the subject but only summarizing background information and context. It is based on the existing works and state of knowledge and the reference list is intended to support further studies of the subject treated, in addition to supporting statements made. As such the Paper should/would be revised as fresh knowledge on this evolving subject is made available and is therefore, recommended.

Activities Undertaken

The Task Force was established in 2009 by the Management Board (MB) at its interim meeting held at Istanbul in March 2009 during the 5th World Water Forum. During the October 2010 meeting at Yogyakarta (Indonesia) MB nominated Mr. Laurie Tollefson (Canada) as Chairman and Ing. Helvecio Mattana Saturnino (Brazil) and Mr. Sanjay Belsare (India) were accepted as members of the Task Force. TF Chair Mr. Tollefson made a presentation on "Water for energy or food" covering a brief summary of the background work of Dr. Henri Tardieu towards forming the Task Force.

TF in its second meeting at Tehran (Iran) in October 2011 finalised its Terms of Reference (ToR) as development of 'ICID's position on Water for Bio-Energy and Food' taking into account: (a) The possible conflict between food production and the production of bio-fuel crops, (b) The use of agricultural water to produce bio-fuel crops, (c) Rain-fed crops, (d) The use of non-food crops to produce bio-fuels, (e) The use of marginal water/soils for the production of bio-fuel crops, (f) The use of recycled water for the production of bio-fuel crops, (g) The contribution of the production of bio-fuel crops to the local/rural economy, (h) The technical requirements to ensure viable production of bio-fuel crops without government financial support, and (i) The use of agricultural waste for the production of the bio-fuel corps. TF also decided to organize a workshop during the 2012 Adelaide conference to discuss member country policies and developments with possible contribution from India, China, South Africa, USA, Canada, Brazil, Europe and Central Asia.

During third meeting of TF in June 2012 at Adelaide (Australia) Mr. Uttam Raj Timilsina (Nepal) and Dr. Fuqiang Tian (China) were accepted as members of the Task Force. An International Workshop on 'Country Policies and Developments of Water for Bio-Energy and Food' was also held on 26 June 2012 where five country presentations from Nepal, India, South Africa and Canada on experiences in biofuel were received. During the 2012 meeting TF agreed to develop a structured position paper outlining the country experiences as a final output. It was also agreed that Iran, Brazil, USA, Australia, China and Great Britain would also be invited during next meeting in Turkey in 2013 to share their country experiences.

IEC/PCTA in the 2013 meeting in Turkey renamed the group as the WG-BIO-ENERGY and also approved extension of tenure of the TF by one year i.e. up to 2014. Dr. Fuqiang Tian (China) made a presentation on the status of biofuels in China during the WG meeting held at Turkey in 2013. During its 2013 meeting the Task Force agreed to bring out the ICID position paper in 2014 for discussion in its next meeting in September 2014 at Gwangju (Korea) based on country reports received from Brazil, Canada, China, India, Nepal and South African National Committees and those expected from Australia, Brazil, Iran and the USA.

During the 2014 meeting at Gwangju (Korea), the WG Chair presented a draft technical paper on 'Water for Bio-Energy and Food' and recommended to close the WG. Since the paper was based on contributions and experiences from a limited number of countries, PCTA suggested to consider this as technical report and not as an ICID position paper. Further, PCTA did not agree to the proposal for the WG to close. They recommended that a new Scoping Document be developed to reorient its objectives and the scope of its activities bearing in mind the importance of the subject and decided to discuss a future course of action during the 66th IEC Meeting in 2015.

Brief summary of activities of the WG-BIO-ENERGY is at **Annex**.

Conclusion and Recommendations

Conclusions

The present world population of about 7.3 billion is estimated to grow to about 9.1 billion by 2050. Currently 1.2 billion people live in water scarce areas. In order to meet the growing food requirement for increased population agricultural production must be increased by approximately 70 percent globally and by 100 percent in developing countries by 2050. Accordingly, present global water demand is projected to increase by 55% with increased competition among various sectors and a reduced share for agriculture. To meet the future global food demand by 2050, irrigation withdrawals may have to increase by 20% (de fraiture, 2007) and at the same time with the growing population energy requirement is also rapidly increasing and energy security is becoming one of the great challenges in view of limited availability of fossil fuel. Many countries view biofuels as an alternative renewal resource and a way out of petroleum based energy security troubles.

Diversion of arable land and water for biofuels production is one of the major concerns as it will add pressure on limited land and water resources that are already stressed and may also impact food security. However, it is not the availability of land but of water that determines the limit of biofuel expansion in a region. The expansion of the biofuels industry is taking place in regions that have encountered an increased energy demand but not necessarily in the regions that are most suited to sustain the feedstocks.

It is believed that biofuels have an important role to play in meeting the world`s energy needs but it should not be at the cost of food security. In the case where increased biofuel usage would leave more people denied of their daily food and water requirement, it may lead to deforestration or to international conflict and in such cases both the short and long term costs outweigh the benefits. Thus it is essential to take a balanced and holistic approach to identify and mitigate the risks and concerns for the sustainable management of food, water and energy security issues. We encourage countries that have the resources to invest in improving biofuels and pushing towards breakthroughs in water efficient biofuels – or have the resources to encourage other countries to do the same – to take full advantage of this opportunity.

Recommendations

In order to encourage production and use of bio-fuels in a sustainable manner the following recommendations are made:

1. Due to the complex nature of the linkages between biofuels and food security occurring at different geographic levels, (local, national, regional, global) and temporal scales, it is essential to adopt integrated evidence based and environmentally sound approaches for biofuel policy – making and investments.
2. Biofuel production will compete with food crops for scarce land and water resources. If all national policies and plans to increase biofuel production are implemented it is estimated that an additional 30 million ha of land will be required with an increase in irrigation water

withdrawals. Since impacts for some countries who have initiated programs to boost biofuel production could be significant, it is necessary to study and analyze the impact of increased biofuel production on food and water security. For example, India and China, who are large producers and consumers of agricultural commodities, already face severe water limitations.

3. Biofuels rely on many of the same policy shortcomings that impede agriculture as a route to poverty reduction. Policy requirements at a country level are required rather than on a global basis. A country by country analysis of the potential impacts of biofuels on land and water resources is required.
4. Political intervention is often required to ensure that reduced food production and increased food prices do not occur in association with biofuel production. This is often more acute with poorer countries.
5. Biofuel crops can reduce poverty in emerging and least developed countries where land and water resources are not under stress through increased employment and economic growth. Further studies are required to determine whether these opportunities really do improve the conditions for poor farmers.
6. Some countries face water and land limitations while others have sufficient capacity provided improvements occur. Global policies should focus on supporting biofuel production in land and water abundant regions that are currently not involved in biofuel production.
7. Careful impact assessment (environmental and social) should form the basis of decision making for biofuel production. Life cycle analysis is an important analytical tool. More work is required on a number of potential biofuels.

Way Forward

There is a need for focussed attention in the following areas:

(a) A continued and enhanced research into cellulosic conversion processes is required to encourage movement toward second generation biofuels based on ligno-cellulosic feedstock.

(b) Encouraging first generation biofuel producers to seek increasingly water efficient biofuels including better use of better irrigation methods to increase their profits since expansion will come from smarter use rather than more use of precious land and water resources.

(c) Enabling the policy environment to encourage public-private partnerships to develop infrastructure for the purpose of efficiently irrigating biofuel feedstock including the re-use of water which may be even more successful with biofuel crops than with typical agriculture.

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Annex

Summary of Activities of WG (2009-2015)

The Task Force was established in 2009 by the Management Board (MB) at its interim meeting held at Istanbul in March 2009 on the sidelines of the 5th World Water Forum. During October 2010 meeting at Yogyakarta (Indonesia) MB nominated Mr. Laurie Tollefson (Canada) as Chairman and Ing. Helvecio Mattana Saturnino (Brazil) and Mr. Sanjay Belsare (India) were accepted as members of the Task Force. TF Chair Mr. Tollefson made a presentation on "Water for energy or food" covering a brief summary of the background work of Dr. Henri Tardieu towards forming the Task Force.

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[3] Five presentations were 'Nepal Non-conventional method of irrigation for food security' by Mr. Bashu Dev Lohanee (Nepal); 'The scope on production and usage of biofuels in Nepal' by Mr. Uttam Raj Timilsina (Nepal); 'Country policies and developments of water for bioenergy and food - India' by Mr. Amit Dutta (India); 'Crop production and water use for biofuels in South Africa' by Mr. André Roux (South Africa); and 'Biofuel production in Canada and opportunities under irrigated cropping systems' by Mr. Laurie Tollefson (Canada).