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## WORKING GROUP ON WATER, FOOD AND ENERGY NEXUS (WG-WFE\_N)

### SCOPING DOCUMENT

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## 1. Introduction

The limited water resources, the increasing demand on food for ever increasing population and the climate change impact are great challenges we are all facing. These challenges require, a number of approaches related to water, crop and field management. Integrated management is the way forward. This can be achieved by considering integrated management within the Water-Food-Energy Nexus. The Working Group on Water and Crops has been focusing on improving the irrigation efficiency and water productivity and over the years this WG produced the FAO Irrigation and Drainage Paper 56 which is now widely used all over the world to estimate the crop water requirement. In the last two years, the WG has moved a step further to include the energy element within the water and crops relation and conducted its first workshop in Bali in 2019 and this year a second workshop is planned in Morocco in December 2020. The work related to the nexus has just started and will require more efforts and activities in years to come. Given, the mandate of the WG on Water & Crops came to its end. It is timely to build on what it has achieved over the past years and adopt a new vision of integrated management. For that reason, the WG W&C would like to adopt the Water-Food-Energy Nexus as a new line of activity and to be named, as Working Group on Water, Food and Energy Nexus (WG WFE\_N). ICID at present has no WG that carries this name and no WG is focusing on WFE Nexus. This will be a unique WG with very topical line of activity.

Although the Nexus concept is not new, it is hard to find practical examples. The WG aims to develop approaches by which we can advise on “how to produce more crop per drop per kilowatt energy and per unit area of land”. This will require more efficient irrigation systems (e.g. Drip – Micro Irrigation) and water saving approaches such as deficit irrigation (regulated deficit irrigation or Partial Root Drying Method, PRD) and subsurface drip irrigation. The WG will focus on such water saving approaches.

With respect to activities, broadly speaking, the following aspects are of major importance:

- (a) interaction between the three elements of the Nexus
- (b) improving the irrigation water use efficient and water productivity;
- (c) developing water saving approaches
- (d) Improving the current methodologies of estimating the irrigation water requirement
- (e) Promoting non-conventional less water consuming crops (quinoa, amaranth, barley, ...etc.)
- (f) Promoting the use of models as management tools.

## 2. Objectives

### 2.1 The WG aims

- (a) to develop approaches by which we can advise on “how to produce more crop per drop per kilowatt energy and per unit area of land”,
- (b) to promote the efficient use of water in crop production,
- (c) to provide models and input to test crop-water-energy models,
- (d) to develop techniques to balance water supply against water demand,
- (e) to promote the multifunctional use of water especially in paddy (rice) cultivation,
- (f) to investigate the adaptation of agriculture to climate change and to promote low input agriculture.
- (g) to contribute to effective implementation of the ICID vision 2030.

### 2.2 Relevance of the Working Group to the scope of the “On Farm” Thematic Area

The WG activities are related to the field scale management of water crops and energy and complements the work of the other two WGs, the WG on sustainable on-farm irrigation system development (WG-SON-FARM) and the WG on use of non-conventional water resources for irrigation (WG-NCWRI). There is no overlapping or duplication between the three WGs. Each WG has different mandate and activities. To our knowledge, there is no WG based on WFE Nexus.

The new WG has taken good note of the activities of these work bodies when preparing this Scoping Document.

### **3. State of knowledge on the topic**

**3.1 The outgoing WG (W&C)** has conducted one workshop on Water-Food-energy Nexus last year in Bali, Indonesia during the ICID annual meeting and planned another one this year in Morocco during the ICID annual meeting. Several sources of information were gathered and more is expected to build a capacity in this new area. Several organizations are interested in the topic, such as FAO, ICARDA, ICBA, IWMI and national organizations.

#### **3.2 Mandate of the Working Group**

Mandate of the Working Group is based on the specific niche that this WG can fill in this area and can be formulated as follows:

- (a) to exchange information, knowledge, and experience, as well as networking on the Water-Food-Energy Nexus topic in order to be up to date with new developments, methods and approaches. This can be the basis for a possible position paper on key issues on the nexus.
- (b) to prepare an overview document on the state of the art on improving water use efficiency and productivity within the nexus.
- (c) to produce a document of impact of climate change and possible use of non-conventional less water consuming crops
- (d) to prepare an overview document on the state of the art on model applications as useful management tools for water, crops, field and energy management within the nexus
- (e) to prepare and present reports on case studies on recent developments in the countries that are represented in the WG; and from presented cases of the workshops
- (f) to organize international workshops, seminars or symposia on the Nexus topic.
- (g) to implement ICID 2030 vision

#### **3.3 How is the Working Group expected to collaborate with the other International Organizations?**

International organizations can contribute to the activities of the WG by nominating Permanent Observers (PO). On the other hand, presentations of the work and achievements of the WG can be presented at the occasion of events organized by international organizations.

### **4. Work Plan**

The WG is expected to investigate, analyze, and disseminate information on new developments and to formulate recommendations. The plan is:

- (a) to exchange information, knowledge and experience, as well as networking on the Water-Food-Energy Nexus topic in order to be up to date with new developments, methods and approaches. This can be the basis for a possible position paper on key issues on the nexus,
- (b) to prepare an overview document on the state of the art on improving water use efficiency and productivity within the nexus,
- (c) to produce a document of impact of climate change and possible use of non-conventional less water consuming crops,
- (d) to prepare an overview document on the state of the art on model applications as useful management tools for water, crops, field and energy management within the nexus,
- (e) prepare and present reports on case studies on recent development in the countries that are represented in the WG; and from presented cases of the workshops,
- (f) to organize international workshops, seminars or symposia on the Nexus topic.

**4.1 A proposal for the three-year rolling plan** is shown in **Appendix A**.

#### **4.2 Target audience**

The target audience for this working group will be managers of irrigation schemes, researchers, consultants, manufacturers, government officials, farmer's representatives and a Team of international organizations working on the topic.

#### **4.3 Outputs**

The expected outputs are those listed above under Work Plan

#### **4.4 Timelines**

As the Water-Food-Energy Nexus is a very important topic. In the light of its role in supporting the global food production, it is recommended that the initial term of this WG will be set at 5 years. The timeline would be based on the scope of work and the expected output. Details of the timeline would be formulated and refined during the inaugural meeting of the WG.

#### **4.5 Collaborators and dissemination strategy**

- 4.5.1 The WG would have to base its activities on an open attitude with a clear scope for invitation of outsiders that are interested in the topic on a Permanent Observer (PO), or ad hoc basis.
- 4.5.2 The dissemination strategy would have to be based of reaching those who can apply the findings and recommendations of the WG in their research and especially in policy development, decision making and implementation in practice.
- 4.5.3. All members and observers of the former WG-WATER & CROP will be automatically members and observers of the new WG except they are not eager anymore to pursue. The remaining members will be nominated by the NCs, assessed and accepted by the WG.
- 4.5.4. Each National Committee is allowed to nominate four professionals related to drainage provided one of them is preferred to be a young professional.



**Appendix A**

**THREE YEAR ROLLING PLAN**

Item of Mandate	2020			2021			2022			2023			Actor(s)
Mailing the Scoping Document to participants (current WG W&C)													Convener
Comments on Scoping Document,													Participants informal meeting
Finalizing Scoping Document and detailing of Work plan													Convener
Invitation to NC for nominations and information													Central Office
													Participants informal meeting
Submission of nominations and information													National Committees
1st Meeting Sydney, Australia													Members and Permanent Observers
Exchange of information, knowledge, experience, networking													Members and Permanent Observers
Reporting on the two workshops on case studies related to Water-Food-Energy Nexus.													Members and Permanent Observers
Preparation and presentation of reports on water saving approaches, improving water use efficiency and productivity													Members and Permanent Observers
Collect and review models, approaches, techniques, methodologies, literature, guidelines, codes of practice, etc.													Members and Permanent Observers
Prepare an overview document on the state of the art on model applications													Selected / nominated members
2nd Meeting in China, including Workshop													Members and Permanent Observers
Produce a document of climate change impact and the possible use of non-conventional less water consuming crops													Selected members
Formulation of recommendations													Selected / nominated Members
Position paper on key issues related to the Water-Food-Energy Nexus													Chairperson, Vice-Chair and Secretary
3rd Meeting including a Workshop													Members and Permanent Observers



Annex

ROAD MAP TO ICID VISION 2030 – ACTIVITIES OF NEW WG-WEF-N

Goals/ Strategies	Activities	Outcomes/ Outputs	Milestone for Year 2018	Milestone for Year 2019	Milestone for Year 2020	Milestone for Year 2021	Milestone for Year 2022	Milestone for Year 2023	Resolution Lead Person
<b>Strategy 5:</b> Supporting water productivity enhancement	5.3 Develop guidelines on efficient use of water in crop production	Guidelines	Outline of guidelines – introduction	Release the first draft guidelines	Finalise the draft guidelines and publish	Tbc next meeting	Tbc next meeting	Tbc next meeting	Merge Item 5 and B1. Dr Marco Arcieri (Italy)
<b>Strategy B1:</b> Supporting Development of Appropriate Policies	1.13 Technical Report on Efficient Use of Water in Crop Production	Report	Prepare the first draft report for discussion	Release the second draft report	Finalise the draft report and publish	Tbc next meeting	Tbc next meeting	Tbc next meeting	Dr Marco Arcieri (Italy)
<b>Strategy C3:</b> Promoting Regional Cooperation	3.2 International Workshop/ seminar on 'Improving Water Productivity in the frame work of Water Energy Food Nexus'	Workshop proceedings	Announcement of workshop	Organising Workshop in Canada	Publication of papers in the Special Issue of the Journal	Tbc next meeting	Tbc next meeting	Tbc next meeting	VPH Laurie C Tollefson (Canada)
<b>Strategy D2:</b> Developing Technical Documents in Non-technical Language	2.2 Crop – Water-Energy Nexus	Technical Report		Workshop	Workshop	Tbc next meeting	Tbc next meeting	Tbc next meeting	Dr K Y Reddy (India)
<b>Strategy E2:</b> Strengthening Extension Services with AWM information						Tbc next meeting	Tbc next meeting	Tbc next meeting	Dr Nader Heydari (Iran)
<b>Strategy E3:</b> Developing and Promoting Tools of AWM	3.1 Support research and development of modelling tools	Development of suitable Models, Sensors, Tools for field use	Prepare action plan	Draft report on various developments	Consolidation and final report	Tbc next meeting	Tbc next meeting	Tbc next meeting	Dr Ragab Ragab
<b>Strategy F3:</b> Technical Training of Young Professionals from Member countries	3.9 Training on Crop Water Models Aqua Crop	Conduct Training workshops		Training workshops		Tbc next meeting	Tbc next meeting	Tbc next meeting	All Members are responsible.

