



WORKING GROUP ON SUSTAINABLE COASTAL ENVIRONMENT REGENERATION (WG-SCER)

SCOPING DOCUMENT

1. Introduction

- 1.1 Coastal zone is the intersection of land and sea, with the characteristics of daily sea level fluctuations due to ocean tides, as well as complex hydro-meteorological conditions of oceanic and continental climate interactions. Coastal zone is also the tail end of rivers and drainages, where confluent land water is discharged into the sea. On the sea side of the coastal zone, there are abundant marine fisheries and very strong and powerful of wind energy, tidal energy, and wave energy, which might be available for development in marine resources, while on the land side, there are vast agricultural and food production areas, increasingly urban and industrial areas, nature and recreational areas. These areas are also potential for developing solar energy, water energy, wind energy and biomass energy. Besides, the estuary areas often consist of various ecosystems, supporting biodiversity. Based on multiple considerations of food production, agricultural irrigation water, drainage and flood protection, proper planning and development of clean green energy not only meets the Sustainable Development Goals (SDGs) but also contributes to net zero carbon emissions by 2050 (2050 Net- Zero Emissions), the national commitment by many countries.

However, these coastal environments and resources have diverse and complex disaster risk issues, such as heavy rainfall and floods in lowlands, over-pumping of groundwater leads to land subsidence and easy flooding, coastal erosion and land loss, seawalls and coastal facility damage, sea level rise under climate change, earthquake and tsunami invasion and destruction of land areas, etc. Therefore, it is necessary to clearly understand these potential disasters with more sophisticated knowledge and technology to upgrade the coastal environment master plan, introduce appropriate clean green energy, so as to ensure responsible newly construction projects operation and maintenance, as well as improvement of existing aging capacity of irrigation, drainage and flood protection facilities.

- 1.2 In view of these illustrative issues, the **Working Group on Sustainable Coastal Environment Regeneration (WG-SCER)** integrated interdisciplinary knowledge and technology to propose a coastal environment regeneration strategy to form the main mandate, including:
- (a) Investigate and review the capabilities of irrigation, drainage, and flood protection facilities in under multiple land use with a focus on the agricultural areas on the landside of coastal areas and coastal topography erosion or accumulation, etc.;
 - (b) Inventory and analyze irrigation water sources, water quantity, water quality, grain farming types and productivity in coastal agricultural areas to understand water supply demand issues;
 - (c) Review and analyze the long-term record data and characteristics of coastal tide levels, and plan regular and accurate surveys of land surface elevations in coastal areas to clarify the proportion of coastal lowland flooding disasters caused by land subsidence and rising sea levels;
 - (d) Comprehensively review the situation of coastal land use and flooding disasters, and formulate readjustment strategies with a focus on the rural areas to improve irrigation, drainage and flood protection infrastructure, designate flood detention areas, and establish adaptive flood management systems;
 - (e) Check or upgrade the sensors, data acquisition and transmission systems of various relevant coastal meteorological, surface water and groundwater observation systems, oceanographic monitoring systems, etc. to maintain normal functions of automation and digitalization, as well as the distribution of representative data devices;

- (f) Analyze and evaluate the feasibility of developing ocean energy, wind energy, solar energy, small or micro hydropower and biomass energy to pursue autonomous utilization of green energy in coastal rural areas;
- (g) Introduce water industry technologies development, such as, the use of green energy for wastewater reuse and seawater desalination, sophisticated agricultural water-saving management and equipment components, leakage detection of water supply facilities, intelligent water management software and hardware technology, etc., to effectively manage irrigation water regulation and dispatch and energy utilization, control over-pumping of groundwater, prevent land subsidence and reduce flooding disasters.

2. Objectives

2.1 Relevance of the Working Group (WG)

2.1.1 The relevance of the working group is clearly defined as follows:

- (a) The topic of sustainable coastal environmental regeneration is based on ICID's vision and mission towards the Sustainable Development Goals (SDGs), and is organized as a working group under the theme of "Natural Resources", one of the four New Strategy Themes;
- (b) The working group is interested in the participation of its members, especially for coastal and island countries to have more members join the working group;
- (c) The working group will introduce water industry knowledge and technology through coastal environmental regeneration, derive green energy and seawater desalination development and wastewater reuse, and effectively provide control and dispatch capacity for irrigation water and other industrial, commercial, and domestic water use, etc. Contribute to reducing water conflicts;
- (d) Under the theme of natural resources, the working group promotes the development of green energy with a focus on coastal agricultural areas to provide rural energy autonomy and contribute to a sustainable and friendly environment;
- (e) Promote the conservation of coastal environments, natural resources, and ecosystems

2.2 Relevance of working groups to the scope of thematic areas

2.2.1 This WG-SCER is one of the technical work bodies established under the theme of "Natural Resources", and the main scope is as outlined and described above.

2.2.2 The scope of this WG-SCER must consider various relevant conditions that affect both sea and land areas. In addition, interdisciplinary integration in professional knowledge and technical fields is also required.

2.3 Existing gap that the Working Group is expected to fill

2.3.1 Other ICID working groups with relevant scope of work include: WG-IWM&D; WG-NWREP; WG-LDRG; WG-RWH; WG-WFE_N; WG-CLIMATE. For more information about these working groups, please visit: www.icid.org

2.3.2 This working group can contribute to intelligent irrigation, drainage and flood protection facilities and management, and conjugate utilization of surface water and groundwater on farms in coastal lowlands.

2.3.3 This working group introduces water industry knowledge and technology to develop seawater desalination and wastewater reuse, which can complement each other with irrigation water management and development and non-conventional irrigation water.

2.3.4 This working group is concerned about the low-lying coastal area where irrigation and drainage tail-water is discharged to the sea. The periodic rise and fall of the sea level with the tide affects the irrigation and drainage capacity. In addition, the irrigation and drainage facilities are located on the coastal area and vulnerable to damage by storm waves.

2.3.5 This working group is also concerned that insufficient irrigation water in coastal agricultural areas and unrestricted over-pumping of groundwater have led to land subsidence and groundwater salinization pollution. Properly plan appropriate areas for large-scale rainwater harvesting basins, which can be

used as surface water storage to supplement water supply and groundwater recharge, and as flood detention basins during floods.

- 2.3.6 The scope and mandate of this working group are directly or indirectly related to other working groups. It is mainly to fill in the missing areas in the past, that is, the scope of irrigation, drainage and water management as well as flood protection in the coastal zone is more complete. With the full collaboration of each working group, fruitful results that complement each other should be achieved for ICID.

3. State of knowledge on the topic

3.1 *Other International Organizations that are working on the subject*

- 3.1.1 There are several other International Organizations that have programs and activities on this topic:

- (a) Food and Agriculture Organization of the United Nations (FAO);
- (b) International Fund for Agricultural Development (IFAD);
- (c) United Nations Educational, Scientific and Cultural Organization (UNESCO);
- (d) United Nations Office for Disaster Risk Reduction (UNDRR);
- (e) Union of International Association (UIA);
- (f) Agricultural Research Service (ARS), Department of Agriculture, USA;
- (g) Water Environment Federation (WEF);
- (h) International organizations such as the World Water Forum (WWF), World Water Council (WWC), International Water Management Institute (IWMI) , World Bank (WB), Asian Development Bank (ADB), etc.

- 3.1.2 There are several other professional water associations that have programs and activities on this topic:

- (a) International Commission on Large Dams (ICOLD);
- (b) International Water Association (IWA);
- (c) International Hydropower Association (IHA);
- (d) International Water Resources Association (IWRA)

3.2 *The niche that the WG ICID is expected to fill in this area*

- 3.2.1 Mandate of the Working Group on Sustainable Coastal Environment Regeneration (WG-SCER):

- (a) To prepare a practical case report on coastal environmental regeneration and disseminate experience and knowledge in workshops or short courses for regional and local re-examination and clarification of coastal issues;
- (b) To organize events and prepare a document to raise awareness that the multiple compound effects of sea level rise, coastal erosion and land subsidence may lead to increased risks in coastal areas;
- (c) To encourage accurate investigation and analysis of irrigation, drainage and flood protection capacity of coastal areas and coastal management master plans to formulate flood management levels to designate adaptive flood management areas;
- (d) To promote the application of Cyber-Physical System (CPS), Internet of Things (IOT), related analysis software and intelligent integrated management technology to achieve an optimized irrigation and drainage management system;
- (e) To organize events and prepare a case report on sustainable development and management of coastal areas and find a balance between the conservation and development of the coastal environment and tidal areas with acknowledgment of ecosystem services;
- (f) To join the international dialogues and organize international workshop, side event talks and short courses to promote interdisciplinary and participatory land and water planning and management in coastal environment and tidal areas;

- (g) To collaborate with other related working groups or international organizations actively, and to exchange relevant experience.

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

- 3.3.1 When international organizations that have signed cooperation agreements or memorandum with ICID have needs for professional consultation, review, training, and activities related to the topics of this working group, the Central Office Referral Working Group will assist in providing comments and suggestions, or jointly apply for collaborative research project proposals.
- 3.3.2 International organizations can contribute to the activities of the WG by nominating Permanent Observers.
- 3.3.3 Presentations of the work and achievements of the WG-SCER can be presented at the occasion of events organized by international organizations.

4. Work Plan

4.1 Scope

- 4.1.1 The scope and mandate of the Working Group on Sustainable Coastal Environment Regeneration (WG-SCER) have almost covered the diverse and complex issues that need to be explored and studied in the coastal zone.
- 4.1.2 The WG-SCER proposed six tasks to achieve the mandate, and also leveraged the expertise of outgoing working group members, whom we welcome to join the working group, and recommended to lead a task if necessary. The six tasks are as follows:

Task 1. Investigate and share practical cases of seaside, landside, and estuary coastal environmental resources and disasters in regional and local coastal zones.

Task 2. Consult and guide the exploration methods of potential threats to coastal environmental issues on the land side of the coastal zone to develop strategies and integrated solutions.

Task 3. Assess and analyze groundwater development and management, surface water and groundwater conjunctive use for irrigation in the coastal zone to estimate land subsidence potential and the possibility of groundwater salinization.

Task 4. Strengthen the promotion of ICID coastal country members to accurately investigate the irrigation, drainage and flood protection capacity of coastal zones and coastal management master plans to formulate flood management levels to designate adaptive flood management areas.

Task 5. Practice and plan modernization, automatic monitoring and control systems in coastal environment and irrigation, drainage and flood protection management.

Task 6. Organize and hold international activities of the working group such as side events, short courses, workshops, symposiums, and special issues.

- 4.1.3 **Annex 1** has the details on the results-based workplan for the period 2024 to 2029.

4.2 Target audience

- 4.2.1 The target audience of this working group will be managers of coastal zone irrigation, drainage and flood protection schemes, green energy schemes, environmental schemes, rural regeneration schemes, professors and researchers, planning engineers and consultants, contractors, manufacturers, government officials, farmers/farmer representatives, students, young professionals, agronomists, coastal and irrigation, drainage and flood protection engineers and staff of international organizations working on this topic (e.g. FAO, IFAD, WB and ADB).

4.3 Outputs

- 4.3.1 The major expected outputs during the six-year life of this WG are the following:
 - (a) At least three working group meetings per year (one physical meeting and two online virtual meetings)
 - (b) The journal "Irrigation and Drainage" publishes two special issues;

- (c) Members of this working group published six country overview documents;
- (d) Organize at least three workshops, side events, young professionals or special forums during ICID annual events;
- (e) A special short course and a visit to demonstration sites for exchange of training technology experience in countries with willing members;
- (f) Exchange of knowledge and experience among representatives of National Committees;
- (g) The results of other activities or events related to this working group.

4.4 Timelines

- 4.4.1 There are complex hydro-meteorological conditions in the coastal zone where the ocean and continental climate interact, and there are abundant natural resources and energy potential to be developed.

Therefore, in order to solve the difficult issues of irrigation, drainage and flood protection in the traditional coastal environment and meet the requirements of global carbon reduction strategies, green energy and water source development must change the concept of innovation, use coastal environment regeneration as the overall planning framework, and introduce modernization technology and water industry are feasible. However, in order for these new concepts and technical knowledge to be recognized and familiarized, it will take some time to learn, train and communicate the integrated technology, which is different from the past irrigation, drainage and flood protection planning and design, construction, operation, maintenance and management. Therefore, it is appropriate for this working group to initially set a total duration of 6 years for the two phases.

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 Observers (PO) or ad hoc basis.
- 4.5.2 The dissemination strategy would have to be based on 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.

5. Core Group

5.1 The Core Group consists of:

5.1.1 Senior consultation and guidance

- (1) President Hon. Prof. Dr. Bart Schulz (The Netherlands);
- (2) President Hon. Peter S. Lee (UK)

5.1.2 The Chair, Vice-Chair, Secretary and Members of WG-SDTA before being transformed into the new WG-SCER are as follows :

(1) Prof. Ruey-Chy Kao (Chinese Taipei Committee), Chair; (2) Ir. Hj. Nor Hisham Bin Mohd Ghazali (Malaysia), Vice-Chair; (3) Er. Paavan Kumar Reddy (India), Secretary; (4) Prof. Budi Santoso Wignyosukarto (Indonesia); (5) Dr. Hiroki Minakawa (Japan); (6) Dr. Hsiao-Wen Wang (Chinese Taipei Committee); (7) Dr. JANG Jeong Ryeol (South Korea); (8) Dr. Mona Liza Delos Reyes (Philippines); (9) Mr. Surat Thanusin (Thailand); (10) Dr. Vijay Labhsetwar (India); (11) Dr. Chung-Feng Ding (Chinese Taipei Committee); (12) Prof. Zhang Zhanyu (China); (13) Dr. Sanidhya Nika Purnomo (Indonesia)

5.1.3 Former WG-AFM outgoing Chair and Secretary: (1) Dr. Kamran Emami (Iran), Chair; (2) Ms. Sahar Norouzi (Iran), Secretary

5.1.4 Former WG-M & R outgoing Chair, Vice-Chair and Secretary: (1) Mr. Ian William Makin (United Kingdom), Chair; (2) Dr. Dong Bin (China), Vice Chair; (3) Engr. Muhammad Sani Bala (Nigeria), Secretary

5.1.5 Former WG-IDM outgoing Chair, Vice-Chair and Secretary: (1) Dr. Ahmet Seren (Turkey), Chair; (2) Dr. Sheng-Wei Wang (Chinese Taipei Committee), Vice Chair; (3) Dr. Katsuyuki SHIMIZU (Japan), Secretary

5.2 Cross-professional and Interdisciplinary Working Group Members

5.2.1 The main purpose of this working group is to focus on coastal disasters such as extreme rainfall, increased drought periods, rising sea levels, more violent storm surges, etc. under today's climate change, which also endanger the production capacity and yield of food production. In addition, more Under the unconscious and uncontrolled behavior of humans over pumping groundwater, the superposition effect of coastal disasters has a more serious impact. This is a very obvious issue of great significance and has reached a time when it is necessary to respond without delay.

5.2.2 Please refer to the content of each sub-item of the main item "2. Objectives" of this document. This WG-SCER working group recruits interested members, especially coastal and island countries, as well as those who have advanced water industry technology and can share knowledge.

