

# POLICY REPORT

CEWP Rural Water and Food Security

August 2022



Rural Water and Food Security  
An action supported by the European Union



## 1 Introduction

This Policy Report is an extract of the Policy Brief “Road to Sustainability”<sup>1</sup>, which is an output of the PI Lot 2 Rural Water and Food Security Project. The policy brief and this policy report are based on EU-China Dialogues at during the past 15 years starting under the EU China River Basin Management Program, which established the China Europe Water Platform (CEWP), followed by CEWP interventions supported by the EU China Policy Dialogues Support Facility and the EU Technical Assistance and Information Exchange Facility (TAIEF).

The CEWP dialogues comprised seven workshops and seminars:

1. EU-China Strategic Knowledge Exchange on Groundwater Policy, Legislation and Standards. Beijing 13<sup>th</sup> -16<sup>th</sup> June 2016
2. PI RURAL Kick-off Meeting. Beijing, 6th-7th March 2018
3. Relations of PI RURAL to the Sustainable Development Goals (SDGs). Qingdao International Water Conference, 27th-28th June 2018
4. Scoping and Focusing the Policy Dialogues on Groundwater Management. MWR, Beijing, 6th November 2018
5. Water Saving by Groundwater Quantity Management. Policy Dialogue seminar, Jinan University, 29th June 2019
6. Water Quality Management. Policy Dialogue Webinar, 26th and 28th October 2021
7. Sustainable Groundwater Management and Use. Policy Dialogue Webinar, 17th and 19th May 2022

The EU–China knowledge exchanges at these meetings resulted in a large number of observations and recommendations for EU and China to consider for future groundwater management, use and protection. The long-list included was condensed into 21 observations, which by voting among the participants in the final webinar on Sustainable Groundwater Management and Use resulted in 9 options for the Joint EU-China CEWP Secretariats to consider as policy recommendations. For a more detailed description of the contents and observations, see<sup>1</sup>.

## 2 Political context

Globally, EU and Chinese water governance has seen 5 major leaps during the past 30 years:

1. The Dublin Principles, Copenhagen Statement and UN Agenda 21 (1991-92)
2. The EU Water Framework Directive (2000) and associated EU Groundwater Directive (2006)
3. The China No 1 Document (2011)
4. The China Groundwater Management Regulation (2021)
5. The UN 2022 Groundwater Summit and associated report “Groundwater: Making the invisible, visible”.

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<sup>1</sup> ChinaRM (2022) Policy brief. Road to Sustainability, Rural Water and Food Security Focus Area.

## 2.1 the Dublin principles

Formulation of the Dublin principles on water resources management started in Denmark in November 1991, when the Danish International Development Agency (Danida) convened the Copenhagen Informal Consultation as a precursor to the Dublin International Conference on Water and the Environment in 1992.

Dublin Principles:

- No. 1 Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment
- No. 2 Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels
- No. 3 Women play a central part in the provision, management and safeguarding of water
- No. 4 Water has an economic value in all its competing uses and should be recognized as an economic good

The Dublin Principles were affirmed and detailed in Agenda 21 Article 18 at the United Nations Conference on Environment and Development (UNCED), the Earth Summit, in Rio de Janeiro in 1992 with the sole modification that water has both a social and an economic value.

## 2.2 The EU Framework Directive

The EU Water Framework Directive (WFD) (2000) and its subsidiary Groundwater Directive (2006) set out several important principles:

1. Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such, to be handed over to future generations in good condition (WFD):
2. Introduced ecological monitoring for characterisation of surface water on the assumption that good ecological status would enable all beneficial uses of water, including abstraction for use as drinking water
3. Identified river basins as the appropriate water management unit, also for groundwater
4. Initiated the systematic mapping and characterisation of groundwater aquifers
5. Introduced the concept of “good status” based on stable groundwater levels and water quality standards, and defined thresholds for action on declining groundwater levels and deteriorating quality

## 2.3 China No. 1 Document

In 2011 the first decision issued by the Central Committee of the Communist Party of China and the State Council was the document “Accelerating the Water Conservancy Reform and Development” (No.1 Document), which guided water resources management and development for the following 10 years.

The opening statement “Water (including groundwater) is the origin of life, the essence of production and the basis of ecology” differs from the EU WFD by ranking production higher than ecology.

The EU China River Basin Management Project (2006-2012) contributed to implementation of the No.1 Document by strategic knowledge exchanges with the MWR Development Research Centre formulating strategy proposals for 3 of 8 Chinese water securities identified in the No.1 Document:

- No.1 Document Flood Security Strategy (Report T-074)
- No.1 Document Water Resource Supply Security Strategy (Report T-075)
- No.1 Document Water Ecology Security Strategy (Report T-078)

The strategic knowledge exchange process inspired the PI RURAL policy dialogues presented in this report.

## 2.4 The Groundwater Management Regulation of China

The Groundwater Management Regulation of China issued in 2021 by the State Council defines for the first time clearly the horizontal responsibilities for groundwater management:

- Ministry of Water Resources shall be responsible for the unified supervision and management of groundwater nationwide
- Ministry of Environment and Ecology shall be responsible for the supervision and management of groundwater pollution prevention and control nationwide.
- Ministry of Natural Resources shall be responsible for groundwater investigation and monitoring

It also defined the vertical responsibilities down to county level.

## 2.5 UN Groundwater Year

In 2022 the United Nations issued the World Water Development Report “Groundwater: Making the Invisible Visible” drawing attention to the global significance of groundwater and the risks that groundwater abstraction and pollution constitutes for sustainable groundwater management and use.

# 3 Key findings and recommendations from the workshops and seminars

The [Strategic Knowledge Exchange Seminar](#) in 2016 on Groundwater Policy, Legislation and Standards took place at the request of the Development Research Centre of the Ministry of Water Resources and in many ways set the frame for the PI RURAL approach to policy dialogues. Prior to this seminar, a number of joint interventions had taken place, e.g., during the CEWP Annual High-Level policy dialogue conferences in March 2014 and 2016 and through an expert mission to Shandong Province in 2015 on monitoring and modelling as part of a groundwater management system for groundwater-based water supply, also financed by TAIEF. These events consolidated the cooperation between the EU partners, the MWR International Economic and Technical Cooperation Exchange Centre (INTCE) and the Water Research Institute of Shandong Province (WRISD).

The six most significant recommendations of the seminar are listed below (for further description and justification, see <sup>2</sup>):

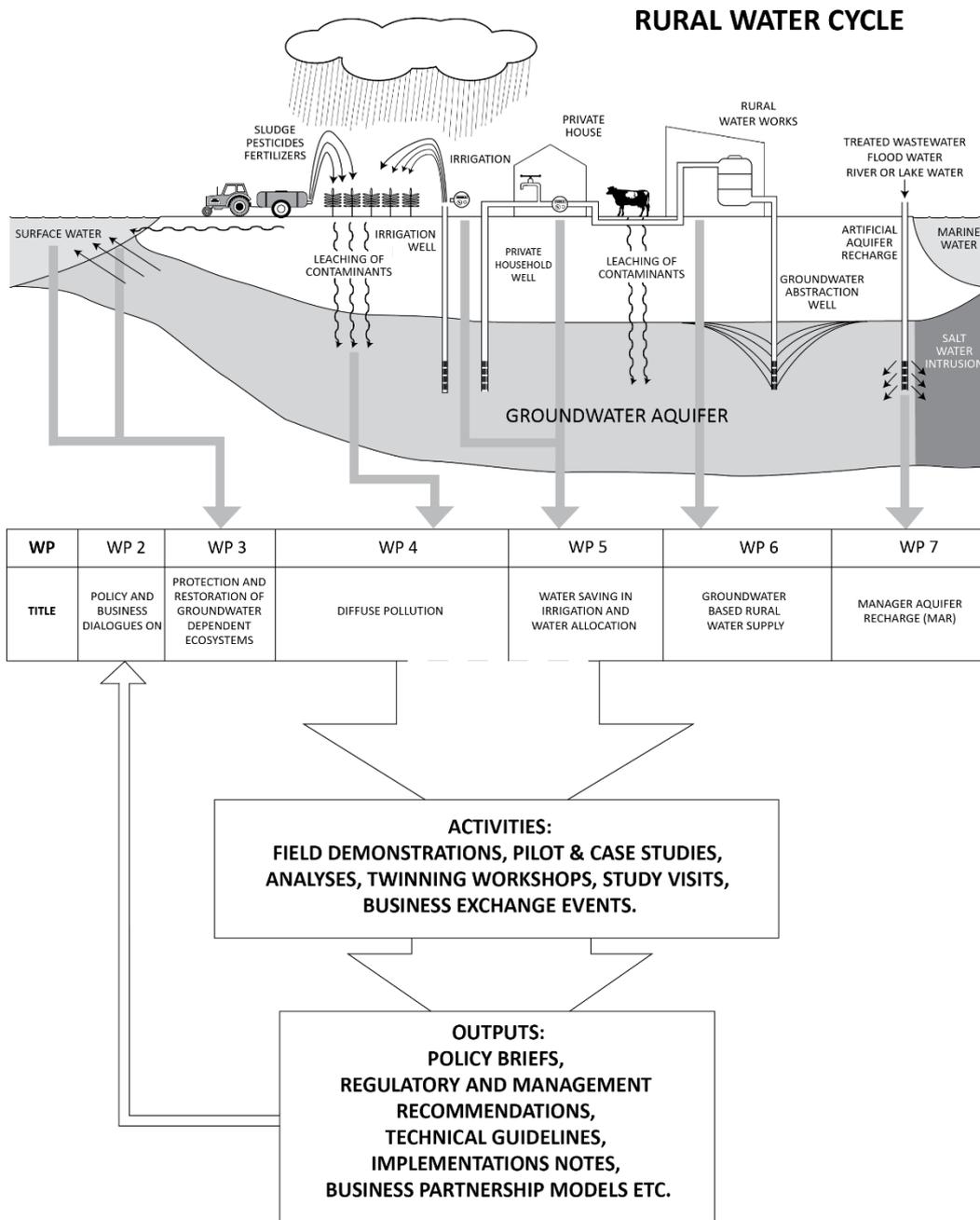
1. Groundwater policy should emphasise the opening statement of the 2011 No.1 Document “Accelerating the Water Conservancy Reform and Development” stating that “Water is the source of life, production and ecology”.
2. Groundwater policy should give first priority to use of groundwater for rural domestic water supply
3. Groundwater policy should recognise the need for protection of groundwater dependent ecosystems
4. National survey, mapping and classification of groundwater aquifers are the first steps towards sustainable management, use and protection of groundwater resources.
5. The value and price of water are among the most effective policy instruments for water resources demand management and should be given a greater role in development of groundwater policy and legislation
6. Monitoring of groundwater levels shall be initiated by identification of baselines for trend assessment and thresholds for remedial actions should be set for groundwater quantity and quality

The [PI RURAL Kick-off Meeting](#) took place in Beijing 5th-8th March 2018. Building on the 2016 Strategic Knowledge Exchange, the meeting defined the PI RURAL structure as shown in the figure below. The

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<sup>2</sup> ChinaRM (2022) Policy brief. Road to Sustainability, Rural Water and Food Security Focus Area

structure is based on the principle that the outputs from the technical work packages 3 - 7 are used as inputs for the policy dialogue meetings and interventions organised within work package 2, which in turn give rise to policy recommendations to be presented to decision makers in China and Europe.



The [first groundwater policy dialogue](#) within the framework of PI RURAL took place at the [Qingdao International Water Conference](#) 27th – 28th June 2018 mapping and analysing the relations of PI RURAL to the SDG6 on water.

The most significant observations were:

- Access to safe water in rural areas is a major challenge for China (and the EU)
- The investment gap to achieve SDG6 Target 1 in rural China can be estimated at 430 billion yuan while the investment gap to achieve SDG6 Target 3 in rural China can be estimated at 180 billion yuan
- The value of water is an important agricultural planning instrument but jeopardised by high subsidies to irrigation water
- The Chinese water resources fee is an important recognition of groundwater having a higher social and economic value than surface water

At the [6th High-Level Annual Meeting of the CEWP](#) in Beijing 6th-8th November 2019 PI RURAL held three workshops setting the frame for policy dialogues on groundwater management 2019-2021.

The most significant recommendations were:

- China needs to develop 3 red lines for groundwater quantity, quality and socio-economic value
- Groundwater quality and protection are imperative for the livelihoods of the rural population of both China and the EU
- Groundwater management systems should ensure better data sharing among different data harbouring institutions
- Awareness raising and education must be strengthened at all levels of society to make the invisible groundwater and its significance to society more visible

In response to the recommendations the PI RURAL decided to schedule 3 policy dialogues, the Groundwater Quantity Management (2019), the Groundwater Quality Management (2020), and the Groundwater allocation and sustainable use (2021).

## 4 Policy recommendations by the PI RURAL Policy Dialogue seminars

The first PI RURAL Policy Dialogue seminar on [Water saving by Groundwater Quantity Management](#) took place at Jinan University 29th June 2019 as a side-event to the 2019 Jinan International Symposium on Sustainable Groundwater Utilisation and Protection. The 3 highest ranked policy options of all options derived from this seminar selected at the 2022 Groundwater Policy Dialogue Seminar were (for a complete list of recommendations, see <sup>3</sup>):

### [Recommendation 1: Awareness raising and education on the value and scarcity of groundwater is imperative for acceptance of water saving measures at all ages and levels of society](#)

Awareness raising and education are two of the main water demand management instruments that must be tailored according to the target groups, i.e., pre-school, school and high-school children, urban and rural residents, noticeably farmers.

### [Recommendation 2: Abstraction permits and volumetric fees are essential for groundwater demand management](#)

Abstraction permits are the primary administrative demand management instrument, which in China was refined during the early stages of the China Europe Water Platform 2012-13 with support of the EU Policy Dialogues Support Facility.

Volumetric fees are the main financial demand management instrument. In rural China they were piloted in the Minqin Oasis in Gansu Province as a pilot for implementation of different aspects of the 2002 China Water Law under the UK-China Water Resources Demand Management Project (2003-

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<sup>3</sup> ChinaRM (2022) Policy brief. Road to Sustainability, Rural Water and Food Security Focus Area.

2005). It was implemented using household electricity consumption as proxy, based on the observation that household electricity mainly was used for pumping of groundwater. In Denmark electricity is also used as proxy for abstraction irrigation water but with the pump supplied via a separate meter.

[Recommendation 3: Managed Aquifer Recharge is an increasingly important method to replenish groundwater aquifers with potential for recycling of slightly polluted water](#)

Managed Aquifer Recharge (MAR) is increasingly used to replenish depleted aquifers or as hydraulic barriers against seawater intrusion. It has the added advantage that slightly polluted water, for instance partially treated wastewater, may be purified during infiltration through soils, riverbeds or riverbank sediments or permeable reactive barriers constructed under infiltration basins.

The [PI RURAL policy dialogue on Groundwater Quality Management](#) took place as two webinar sessions 26th and 28th October 2021, and the 3 highest ranked policy options selected at the 2021 Groundwater Policy Dialogue Seminar were (for a complete list of recommendations, see<sup>2</sup>):

[Recommendation 4: Groundwater quality may be protected by red lines for issue of warnings and measures for remedial actions at critical levels of pollution](#)

In China definition of groundwater pollution recognises 5 categories depending on the scale of human impact, ranging from low natural concentrations of contamination reflecting equilibrium with the host rocks to water not eligible as a source of drinking water. The corresponding standards approach international levels, but in rural areas a limited number of parameters are applied. In the EU a more concrete but also more complex approach is taken by setting a starting point for remedial actions in the form of a review, risk assessment and decision on mitigating action to be taken, when an increasing trend of a pollutant passes 75% of the groundwater quality standard or threshold value.

[Recommendation 5: Groundwater monitoring programs should be risk-based and reflect the local social and economic value of groundwater](#)

A cost- and resource-efficient groundwater monitoring program comprises a common set of parameters, which in rural China is limited to 14 parameters. The basic parameters should be expanded based on an assessment of local risks for geogenic pollution, e.g., arsenic, fluorine and iodine, or of pesticides commonly used in local agriculture.

The risk assessment may also determine the sampling frequency, for instance based on the number of people depending on the groundwater source.

[Recommendation 6: Groundwater quality in rural areas shall be protected against diffuse agricultural pollution \(e.g., by cover crops, reforestation or bans on pesticides\)](#)

The risk of diffuse pollution from agricultural land may first and foremost be reduced by applying the agro-environmentally optimum fertilizer rate to crops and accounting salinity and nutrient status of the irrigation water. Groundwater levels should be temporarily monitored to ensure “strategic groundwater reserve” during extraordinary drought events. As in the EU, cancer-generic pesticides should be banned or their use strictly monitored in space and time, including pesticides concentrations in groundwater. Protective buffer zones of 25 m around well without any human activities and 300 m without wastewater or pesticides use.

The final [PI RURAL policy dialogue on Sustainable Groundwater Management and Use](#) also took place as two webinar sessions 17th and 19th May 2022, and the 3 highest ranked policy options were (for a complete list of recommendations, see<sup>2</sup>):

**Recommendation 7: Groundwater, like surface water, is the source of life, ecology and production and shall be managed, allocated and used according to its social and economic value**

This statement reflects the Dublin Principles, the China No.1 Document and the EU WFD within the modifications that achievement of SDG6 must be highest on the global agenda in the short term while healthy ecosystems able to deliver ecosystem services must have higher priority than production in the long term.

Approaches to the financial and economic valuation of ecosystem services of groundwater dependent ecosystems need to be developed in order to communicate their significance to politicians and decision makers.

**Recommendation 8: Increased attention to groundwater quantity and quality is of utmost importance for the achievement of the SDGs**

SDG6 on Water is one of the most important SDGs as water also is a catalyst to achieve most of the remaining 16 SDGs (Appendix 13). DG6 is dedicated to water and access to groundwater is particularly important to achieve target SDG6.1 in rural areas. Groundwater is also important to other SDG6 targets noticeable 6.3 (Improve water quality, wastewater treatment, and safe reuse), 6.4 (Increase water-use efficiency and ensure freshwater supplies and 6.5 (Implement integrated water resources management), and contributes to 14 of the 17 SDGs

**Recommendation 9: Groundwater constitutes the main unrealised potential for development of safe and affordable rural drinking water supply in the EU and China**

Groundwater occurs (almost everywhere) in sufficient quantity and adequate quality to sustain basic human needs for safe and affordable drinking water and household food production in rural areas, but it is vulnerable to depletion by excessive abstraction and to pollution.

## 5 Future cooperation

The main objectives of PI RURAL, which also constitute the objectives of the Rural Water and Food Security focus area for the same period, have been or are expected to be achieved during the project period ending in 2022. For details on the outputs, outcomes and expected impacts of the PI RURAL, please see the Lot 2 Interim Narrative Report 2021.

The project, nonetheless, has been affected by a lack of physical meetings since the start of the COVID 19 pandemic in terms of limiting the discussion and the alignment of the ways forward after the end of PI RURAL

### 5.1 Key issues for future cooperation

A number of key issues have appeared during the project, which would be very good candidates for future cooperation between the EU and China, both in terms of knowledge exchange and also joint research and innovation. Since the start of CEWP and also since the outset of the PI RURAL project, a number of existing challenges within sustainable groundwater management in both Europe and China have accelerated, including:

- **New agricultural contaminants** calling for revision of groundwater monitoring programmes and development of new approaches and analytical (screening) techniques for groundwater pollution control and early warning. In Europe, a number of new persistent pesticide metabolites have been identified, i.e. 2,6-Dichlorobenzamide (BAM) and N,N-dimethylsulfamid (DMS), with chemical

characteristics enabling them to be transported very easily by groundwater and therefore posing new risks for groundwater-based drinking water supply, especially in rural areas. In China, there is an upcoming understanding of the challenge posed by pesticides in groundwater, but the monitoring programmes have not been revised accordingly.

- China has developed a large groundwater monitoring network based on *on line* sensors rather than hands-on analytical measurements in the laboratory, which also in Europe will be the way forward. However, for this purpose there is a need for development of **new cost-effective sensor technologies**, which could benefit from cooperative efforts building on both Chinese and European experience on detection methodologies, micro-manoeuvring, and mobile data transfer.
- The **effects of climate change** on groundwater especially in areas with water scarcity of seasonal, asymmetric precipitation have become more evident, increasing the need for water saving measures and groundwater quantity restoration and targeting both agricultural irrigation practices and domestic consumption.
- **Source protective measures** have to be prioritised in areas with heavy use of groundwater for domestic water supply and irrigated agriculture to ensure long-term sustainability in both China and Europe. Thus, new modelling tools and practices as well as improved use of groundwater quantity and quality management procedures have to be put in place alongside the design and the effective implementation of integrated water resources management targeting multiple concurrently occurring pressures.
- Use of **geophysical TEM methods** for more precise delineation and mapping of groundwater aquifers used for groundwater-based drinking water supply and for exact siting of groundwater wells.
- **Managed Aquifer Recharge (MAR)** is a very effective tool for groundwater restoration and to counteract groundwater overexploitation. However, in both Europe and China there is significant reluctance to use reclaimed wastewater for MAR due to the risk of groundwater contamination, although this method is being developed in other parts of the world, i.e. in Australia and California. Therefore, focus on the risks and the measures to prevent groundwater contamination would be relevant in a future cooperation, as well as legal constraints preventing such approaches.
- **Compact treatment technologies** for common pollutants in rural areas, e.g., nitrates, arsenic, fluorine, and pesticides are required to ensure a safe village-level water supply.

## 5.2 EU funding for future cooperation

Thus, there is no doubt that both Europe and China could benefit from future joint interventions – focusing on research, innovation or knowledge sharing - within the groundwater management domain. Such joint effort will depend on proper and ear-marked multilateral or bilateral funding mechanisms, which neither are in place in Europe, i.e. in Horizon Europe, INTPA, or within national funding agencies, nor in China within MOST or Chinese resort ministries. Efforts, however, are evident towards facilitating research and innovation cooperation between EU and China, such as the several proposed calls in the Horizon Europe Work Programme 2023-2024, with relevancy for groundwater monitoring and management.