

# What SDG6 is about: ‘sustainable management’ or ‘rational use’?

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## Abstract

The paper describes the Global Water Partnership partner experience in the introduction of risk-based Integrated Water Resources Management (IWRM) into the Ukrainian water policy. We concluded that some proper ‘expressions’ and concepts have already been introduced into Ukrainian legislation, but not the accepted ‘meanings’ of such concepts as IWRM, Sustainable Development Goals (SDG), and water security. The concept of ‘sustainable management’, in the Russian version of Water SDG6, is translated as ‘rational use’ but no one can explain why. We suggest that such a misunderstanding happened since Ukrainian decision-makers still perceive themselves only as water users who are not obligated to achieve any development goals. Therefore, they are quite comfortable with the existing normative approach to water management where the objectives are compliance with defined norms and ensuring water security, which is understood as an absence of any water risk solely to humans, rather than the environment at large. Keeping in mind that true science starts with measurable values, and recognizing that you cannot manage if you cannot measure, we propose to change this false understanding of water security and sustainability that is inherent in the outmoded concept of ‘rational use’. Such a shift is only possible by switching to a measurable goal-oriented approach and risk management in water policy.

*Keywords:* IWRM; Rational use; Risk; SDGs; Sustainable management; Water security

## Highlights

- The article describes the Global Water Partnership partner experience in the introduction of risk-based IWRM into the Ukrainian water policy where the concept of ‘sustainable management’, in the Russian version of Water SDG6, is translated as ‘rational use’.
  - We suggest that this happened since Ukrainian decision-makers still perceive themselves only as water users who are not obligated to achieve any development goals.
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## Introduction

Ukraine and most former nations of the USSR were quite comfortable with existing normative approaches to water management (Woodhouse & Muller, 2017), where the objective was mere compliance with predetermined norms or standards and where water security was understood as an absence of any water risk, primarily health and safety risks to the human population.

Ukraine first faced the challenge of introducing the Integrated Water Resources Management (IWRM) approach into its national policy discussions during the Johannesburg Summit on Sustainable Development (2002). For example, it was not clear why translators used one English word – ‘complex’, to translate another English word – ‘integrated’, in para. 25 of the Johannesburg Plan of Implementation (UN, 2002). Another problem with translation was the word ‘management’ which, in the case of water, was always translated as ‘use’, shifting the focus towards human use of water only, excluding instream uses, ecosystems, and even recreational uses. Also misinterpreted was the keyword ‘sustainable’, which was translated as ‘rational use’ [рациональное использование] into the official UN Russian translation.

This misunderstanding was further deepened within the UN Sustainable Development Goal (SDG) development process where, until now, the words ‘sustainable management’ in the Water SDG6 are translated into Russian as ‘rational use’ (UN, 2015). Anyone in Ukraine could see the difference between the official UN-translated Russian and English texts of SDGs but could not explain the reasons for such differences. We suggest that such a misunderstanding occurred because Ukrainian water managers and policy decision-makers still perceive themselves only as water users who are not obliged to achieve any sustainable development goals.

To overcome limitations of the traditional water management approach, and having long experience in building Decision Support Systems (DSS) for off-site emergency management in case of a nuclear accident in Europe (European Commission, 2000), we, at UCEWP as a partner of Global Water Partnership (GWP), proposed rethinking water security and introducing integrated risk management approaches into water resources management in Ukraine (GWP Ukraine, 2016). The main idea was to support the ability of Ukrainian water decision-makers to run scenario simulations for attaining optimal sets of measures to reach water-related SDGs for Ukraine.

Scenario analysis requires a predictive probabilistic model because it is difficult and expensive to build a satisfactory picture based only on measurements for deterministic models. Probabilistic statistical analysis, however, introduces considerable scientific uncertainty that is poorly tolerated by policymakers. We, as representatives of academic institution building DSS for policymakers, were quite aware of this so-called science-policy gap defined as the difference in levels of confidence for a given scientific finding expressed by the scientific community and society because, for scientists, the probability and uncertainty are an accepted aspect of analysis, whereas, for government policy and decision-making, certainty is desired (Bradshaw & Borchers, 2000). In the case of global climate change, analysis narrowing the science-policy gap in water management is particularly important as people will experience the impacts of climate change mostly through the impacts on water availability and environmental quality – mainly via floods, droughts, and degraded water quality.

Below is a description of GWP’s experience in Ukraine of the ‘Rethinking Water Security’ campaign, where we tried to realign the definition of water security and sustainable development, linked with that of scientific uncertainty by decision-makers, with that of the science community in Ukraine (GWP Ukraine, 2016, 2017, 2019).

## Methods

The easiest way to understand the difference between ‘integrated’ and ‘complex’ management is to compare their definitions. Classic GWP’s definition of IWRM describes it as ‘a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems’ (GWP, 2000). The official Russian translation of the Johannesburg Plan of Implementation (UN, 2002), transformed the word ‘integrated’ into ‘complex’, thus creating an impression for Russian-speaking water managers in Ukraine that IWRM is the equivalent of a well-accepted Soviet-era understanding of ‘complex use and protection of water resources’ as a ‘set of measures to reduce water consumption and increase the efficiency in different economic sectors’. One can see that the main difference between the two definitions is that ‘complex’ has no reference to sustainability or integration, via sound water management, of the principal objectives of sustainable water management – social, economic, and environmental.

Since 2002, GWP, at the global level, spent considerable efforts to promote its definition of IWRM, insisting that water resources should not be used just ‘rationally’, i.e., economically efficient. This definition was mainly useful if the water is considered primarily as a factor in economic production, shifting the focus towards human use of water only, excluding instream uses, ecosystems, and even recreational uses. GWP is proud that the word ‘management’ was finally included in the terminology of UN SDGs (Jønch-Clausen, 2004; Shah, 2016). But this success relates to the English text of SDGs only, while the words ‘sustainable management’ in the Water SDG6 are still translated into Russian as ‘rational use’. Ukraine faces a similar problem. Despite all efforts of GWP in Ukraine, all amendments to the Water Code of Ukraine (Ukrainian Parliament, 2020) mention that integrated management is the equivalent of complex management but only at the basin level.

Failing in this legal and administrative battle of definitions, GWP decided to focus their attention and efforts to a better-grounded scientific emphasis, keeping in mind that true science starts with measurable values and that resources cannot be effectively managed if they cannot be adequately measured. What performance indicators could be measured that are representative of a broad concept, such as IWRM? Explaining after the Johannesburg Summit, the difference between IWRM and traditional water planning of the 20th century, GWP (Jønch-Clausen, 2004) proposed that the main difference is that IWRM has a principal goal. The best example of such a goal is proposed by the EU Water Framework Directive (WFD), where the main aim is to reach a ‘good state for all waters’, which means instream water quality improvements that translate into ecological improvements and better water quality for all human uses and for ecosystems. Achieving such a goal could be readily measured and therefore water could be managed much more effectively and efficiently (OECD, 2011, 2015; Woodhouse & Muller, 2017).

On the other hand, Woodhouse & Muller (2017) mentioned that traditional water management is based on the normative approach when the objective is compliance with some norms or standards. Limitations of such approaches for development planning are well described in the European Commission Guide on the convergence of traditional water planning with the EU Directives (European Commission, 2003). First, compliance is hard to measure as it could provide YES or NO answers only. Second, traditional water management uses norms developed within the concept of ‘zero-risk’ to human health. But no development strategy can be developed if any risk is deemed unacceptable. Zero-risk is practically unattainable, and simply not cost-effective, especially in water quality considerations.

Ukraine is designated as an ‘associated country’ with the EU and its new Environmental Strategy (Ukrainian Parliament, 2019) speaks of ‘supporting sustainable development and reducing environmental risks’ rather than ‘normative environmental protection and ensuring environmental security’. But this understanding is not incorporated yet into the water and civil defense policy and legal documents, where water and civil security is still understood as ‘an absence of any risks’. In this situation, Ukrainian water managers are quite comfortable with such a two-tiered compliance system as they are not obligated to achieve any sustainable development goals, focusing primarily on human health and safety objectives. Traditional water planning envisages only one commitment of water agencies – protection of water resources for human use, but not reaching any substantive degree of sustainable water resources management.

The current understanding, by Ukraine’s water management sector, of sustainable development (SD) is purely social; they think that SD is ‘the right of future generations to satisfy their [material] needs’ rather than their ‘ability to satisfy their present and future social, ecological and economic needs through integrated resources management’. Therefore, they do not understand why they have to achieve any measurable SDGs, as the ‘right to clean water’ is already included in the Ukrainian Constitution and ‘rational use of water resources’ is already included in the National Water Code (Ukrainian Parliament, 2020). Thus, it is difficult to assess implementation progress and compliance with either IWRM objectives or SDGs when the legislation itself still conveys the outmoded and largely discarded sense of what modern water management aims to achieve.

For the same reason, DSS based on optimization modeling is not requested by Ukrainian water managers. The adoption of UN SDGs in 2015 provided Ukrainian water management and environmental ministries a good opportunity to introduce and demonstrate the advantages of optimization modeling to ensure the effective and efficient achievement of SDGs. In 2017, GWP and the Ministry of Ecology and Natural Resources of Ukraine conducted a joint baseline study of SDG6.5.1. Indicator – *Degree of IWRM Implementation (0-100)* (UN Environment, 2018), to assess the progress in implementation of water-related SDG6.5 *IWRM Implementation*, where Ukraine scored only 39/100 points (DHI, 2017).

## Results and discussion

Such a low score on IWRM implementation prompted discussions in Ukraine, as many water managers were sure that IWRM, which was equivalent to the Soviet-style complex WRM in their minds, was already rather well implemented in Ukraine. To support further discussions on the meaning of sustainability in the water sector, GWP organized a national policy dialogue on Water Security and Management with a series of on-line surveys (GWP Ukraine, 2016, 2017, 2019), to clarify what the SDGs meant for Ukraine and its water management community, and what type of management – integrated or complex – should be implemented in Ukraine within SDGs’ achievement process. As a result, GWP discovered that when managers (especially young) understand that they have to assess the degree of IWRM, not the degree of ‘complex’ WRM, they halved the score for the degree of IWRM implementation – to approximately 20 points. An equivalent outcome was obtained with the assessment of sustainability – when managers understood that sustainability does not equate to the rational use of water, they put rather low scores on the degree of water-related SDG implementation in the Ukrainian policy documents.

We believe that the reasons for adherence to a standards-based normative approach in traditional water management in Ukraine go back to:

1. a false understanding of water security as an absence of any water risk;
2. institutional non-compliance with OECD water governance principles.

To change such traditional thinking, GWP together with the Ministry of Ecology and Natural Resources of Ukraine organized the Rethinking Water Security campaign (GWP Ukraine, 2016), following the guidelines proposed by OECD (OECD, 2011, 2015) and by GWP (Shah, 2016). Based on the results of the series of National Dialogues on Rethinking Security in Ukraine, a fundamental shift in approach to tackling water security was proposed. To develop policy responses to achieve water security objectives, national authorities were urged to:

1. switch from the ‘control’ over resource-related hazards to the management of acceptable or socially ‘tolerable’ levels of four water risks – the risk of shortage (including droughts), the risk of inadequate quality, the risk of excess (including floods), and the risk of undermining the ecological resilience of freshwater systems;
2. incorporate, in legally binding documents, the OECD Principles on Water Governance (OECD, 2015), where:

*‘Effectiveness relates to the contribution of governance, i.e., existing institutional responsibilities to define clear sustainable water policy goals and targets at all levels of government, to implement those policy goals, and to meet expected targets.*

*Efficiency relates to the contribution of governance to maximize the benefits of sustainable water management and welfare at the least cost to society.*

*Trust and engagement relate to the contribution of governance to building public confidence and ensuring the inclusiveness of stakeholders through democratic legitimacy and fairness for society at large.’*

As a result of these intense and lengthy discussions over the last five years, the Ukrainian Parliament finally adopted the National Strategy on Environmental Policy until 2030 (Ukrainian Parliament, 2019). The updated strategy incorporated the recommendations of the GWP-led National Dialogues and replaced the old environmental goals on ‘ensuring environmental security and normative environmental protection’ with the new ones – ‘ensuring SD and reducing environmental risks’.

The first important conceptual step has been accomplished. However, the stakeholders from different sectors of Ukrainian society still lack a clear understanding of risks associated with natural and man-made hazards, where, according to the Sendai Framework, ‘risk’ is defined as a product of ‘hazard’, ‘exposure’, and ‘vulnerability’ (OECD, 2013; UNISDR, 2015). These nuanced differences can be illustrated by the policy discussion in the Parliament of Ukraine. The initial version, proposed by GWP and supported by government after wide consultations with key stakeholders, suggested the following formulation of Goal #4 – ‘reducing environmental risks to ecosystems and population health to a socially acceptable level’. However, the final version was phrased by the Ukrainian Parliament as ‘reducing environmental risks to minimize their impact on ecosystems, socio-economic development, and public health’.

Although the distinctions are small, the final Parliamentary phrasing appears to already include acknowledgment of a socially acceptable tolerance of risk [‘... minimize their impact on ecosystems,

socio-economic development and public health’]. Decisions and policies on how to ‘minimize risk’ will be forthcoming, after considerable debate. However, other debates in Parliament demonstrated that there were several problems with their understanding of ‘risk’.

First, it represents a top-down perception of risk, meaning that the Parliamentarians and policymakers understand ‘risk’ primarily in terms of ‘hazard’ only, focusing on community ‘safety’ as a principal adaptation goal. Such understanding favors specific infrastructure solutions while neglecting other factors of risk, such as poor land use management, outdated building codes, or permissive flood plain zoning. Second, in the minds of Parliamentarians, ‘environmental risk’ serves as a synonym for ‘natural hazard’, neglecting anthropogenic impacts on the environment and their adverse effect on measures and actions, intended to mitigate the damage of natural hazards on the populace.

To improve understanding of the above-mentioned terms, GWP initiated an institutional governance analysis of the national adaptation of SDGs relying on GWP experience in the promotion of IWRM. Comparing nationally adapted SDGs with the globally accepted ones, GWP came to several important conclusions that all are related to a commitment to water-related global SDGs and compliance with OECD Principles on Water Governance (Demydenko, 2018, 2019):

1. For Ukrainian decision-makers ‘water management’ still means just ‘rational [i.e., economic] water use’ that maximizes economic benefits. Such an approach subordinates all other water objectives, focusing only on the observance of existing norms, regulations, and standards to maximize economic outputs.
2. The central government in Ukraine, i.e., its ministries and agencies, are not responsible for the achievement of water-related SDGs, especially for the results of river basin management plans (RBMP) and achievement of the improved condition of all water.
3. The central government still feels entitled to largely disregard Parliament’s Environmental Law and distributes over 90% of governmental funding in pursuit of whatever priorities that it deems relevant.
4. Recently established River Basin Councils have merely an advisory role to the government in water management and have not been influential in steering the basins towards SDGs – as yet.
5. As to ‘clarity of roles and responsibilities’ (OECD Principle 1 on Water Governance), the River Basin Councils remain highly disaggregated and fragmented, limited mainly to infrastructure management – maintenance, operations, and construction. There is a sizeable gap in the effective and efficient coordination of policies, regulatory reforms, and river basin planning procedures that are essential to deal with the broad issues of water security, climate adaptation, river basin management, and sustainable development – i.e., the core of IWRM.
6. We see more evidence of the above when looking at Principle 2 (Appropriate scales within basin systems). The RBMPs were formally introduced in the Water Code at the end of 2016, but they are to be implemented by basin branches of the Water Agency and to be approved by central government, which has no formal role in water resources management. Furthermore, currently, no agency is formally responsible for oversight of and performance accountability in achieving the ‘good state’ of water resources by implementing the stated goals, objectives, and action plans of the RBMPs.
7. Referring to OECD Principles 3 and 4 (Policy coherence and Capacity), we conclude that cross-sectoral coordination is absent in practice since integrated management is simply understood as developing any water management plan at the basin level, without inclusive stakeholder engagement.
8. There is currently no regulatory framework that provides for environmental liability and responsibility to reach the requisite ‘good state’ for water resources, therefore no economic mechanism for IWRM could be developed (Principle 6 – Water pays for water).

9. The provisions of the EU Water Framework and Flood Directives were transposed literally, while in practice, the main goals – reaching ‘good state for all waters’ or ‘reducing flood risks’, are not being pursued (Principle 7).
10. Finally, as to stakeholder engagement (Principle 10), proposals to manage water ‘for all’, to introduce the ‘water pays for water’ principle, and to provide River Basin Councils with decision-making power for truly integrated water management are still pending.

Formal national adoption of Global SDGs in Ukraine took place only in September 2019, mandated by the Presidential Decree on Ukrainian SDGs (President of [Ukraine, 2019](#)). Analyzing this decree and subsequent government action plans using the above-mentioned proposals and recommendations, it is apparent that upon comparing the respective formulations of global versus Ukrainian national water SDGs ([GWP Ukraine, 2019](#)), several key governance gaps remain:

1. For the first time since 2002, ‘sustainable management’ was not translated as ‘rational use’. However, ‘availability’ is still translated as ‘accessibility’, while the words ‘for all’ are still missing. It indicates that the government still views water management in terms of primary uses, rather than being a water manager for all.
2. The government does not fully accept a commitment to improving freshwater quality and for reaching a ‘good state’ for all waters. It only accepts the responsibility for reducing pollution by increasing inspectorate and governmental control over compliance with norms. This attitude is demonstrated clearly in that the mandate of the Ministry of Ecology and Natural Resources has been recently reduced to the Ministry of Environmental Protection and Natural Resources only. Government still ignores the obvious conclusions of the National Dialogue that reduction of pollution does not automatically provide for a ‘good state’.
3. Throughout 30 years of independence of Ukraine, pollution loads have decreased three-fold, because of de-industrialization of Ukraine, but freshwater quality and availability have not improved accordingly.
4. Government considers water only as a source of income and economic good, and commitments for sustainable water withdrawal are ignored.
5. IWRM implementation is among the formally declared governmental goals, even as IWRM is still incorrectly defined. Instead of Global Indicator SDG6.5.1 *Degree of IWRM Implementation (0-100)*, the National Indicator *Number of basin plans* is applied as a substitute, thereby demonstrating that the concept of IWRM is incorrectly understood;
6. Global SDG13.1 mentions efforts to ‘increase resilience and adaptive capacity’, while the corresponding respective government goal only speaks of the readiness of Ukrainians to adapt to climate change. It uses *Reduction of GHG Emissions* as the national indicator for adaptation [rather than mitigation], demonstrating that the role of water in climate change adaptation is fully misunderstood and misrepresented, confusing climate mitigation actions with those of adaptation.

## Conclusions

We can conclude that in water management, as in response to the COVID-19 pandemic – ‘governance is more important than markets’ ([Meuleman, 2020](#)). While Ukraine is legally and legislatively complying with EU norms for IWRM and sustainable development, their administrative implementation actions of various agencies, regulatory bodies, and River Basin Councils demonstrate a lack of understanding and appreciation for the complexities of these concepts in a practical sense.

Overall, the results of a GWP-led governance assessment of water-related SDGs implementation can be summarized as follows: while the proper vocabulary of IWRM and sustainable development have been introduced into legislation, the meanings and operational understanding are not yet accepted or correctly interpreted. This applies to the suite of interrelated concepts, such as SDG, IWRM, Adaptation, Resilience, Risk reduction, and OECD Water Governance Principles (Effectiveness, Efficiency, Trust and Engagement).

It will take some time before the concepts are not only understood by practitioners but put into practice by them, as well. Many other developed nations have gone through these phases. One should not expect Ukrainian water managers and decision-makers to suddenly begin implementing these complex ideas – particularly in the difficult circumstances that Ukraine finds itself – an economic downturn, grave budgetary shortfalls, a war in the eastern region of Donbas, and other regional security threats. There are other mechanisms, however, that can be employed to prepare the River Basin Councils, e.g., through the use of collaborative decision-making simulation and optimization models. These are various low-cost collaborative modeling means for exploring various combinations of cost-effective measures that could start addressing the needs of citizens while practicing the principles of SD, IWRM, and climate adaptation (Ray & Brown, 2015; Mendoza *et al.*, 2018).

Recommendations for further action include several issues: promote further implementation of risk-based IWRM; conduct a second assessment of SDG6.5.1; implementation assessing compliance with the OECD Water Governance Principles; promote reformulation of environmental security and environmental risks in Ukrainian legislation per the definitions of the Intergovernmental Panel on Climate Change and the Sendai Framework for Disaster Risk Reduction; promote inclusion of water role in adaptation in the second Nationally Determined Contribution to the Paris Agreement, and promote collaborative risk-based decision models in each of the river basins.

### Data availability statement

All relevant data are included in the paper or its Supplementary Information.

### References

- Bradshaw, G. A. & Borchers, J. G. (2000). Uncertainty as information: narrowing the science-policy gap. *Conservation Ecology* 4(1), art7. Available at: <https://www.ecologyandsociety.org/vol4/iss1/art7/> (accessed 22 March 2020).
- Demydenko, A. (2018). Updating Ukraine's water governance system: from infrastructure to governance-oriented institutions. In: *Implementing the OECD Principles on Water Governance: Indicator Framework and Evolving Practices*. OECD Publishing, Paris, France. <http://dx.doi.org/10.1787/9789264292659-en> (accessed 22 March 2020).
- Demydenko, A. (2019). Enhancing the emergency preparedness of flash flood victims in the Moldavian-Ukrainian transboundary Prut river basin by establishing a numerical flash flood early forecasting service: case study. In: *Applying the OECD Principles on Water Governance to Floods: A Checklist for Action*. OECD Publishing, Paris, France. <https://doi.org/10.1787/d5098392-en> (accessed 22 March 2020).
- DHI (2017). *IWRM Data Portal, Country data – Ukraine, Main section scores SDG 6.5.1 baseline year 2017*. UN Environment – DHI Centre on Water and Environment. Available at: <http://iwrmdataportal.unepdhi.org/Data.html?Country=Ukraine> (accessed 22 March 2020).
- European Commission (2000). *RODOS: Decision Support System for off-Site Nuclear Emergency Management in Europe*. Office for Official Publications of the European Communities, European Commission, Luxembourg.
- European Commission (2003). *Convergence with EU Environmental Legislation in Eastern Europe, Caucasus and Central Asia: A Guide*. Office for Official Publications of the European Communities, European Commission, Luxembourg. Available at: [https://ec.europa.eu/environment/archives/enlarg/pdf/convergence\\_guide\\_en.pdf](https://ec.europa.eu/environment/archives/enlarg/pdf/convergence_guide_en.pdf) (accessed 22 March 2020).
- GWP (2000). *Integrated Water Resources Management*. Global Water Partnership (GWP) Technical Committee Background Papers No. 4. GWP, Stockholm, Sweden.



- GWP Ukraine (2016). Adamenko, T. I., Demydenko, A. O., Romashchenko, M. I., Tsvietkova, A. M., Shevchenko, A. M. & Yatsyuk, M. V. *Rethinking of Water Security for Ukraine*. Global Water Partnership Ukraine, Kyiv. Available at: [https://www.gwp.org/globalassets/global/gwp-cee\\_files/regional/rethinking-water-security-ukraine-2016.pdf](https://www.gwp.org/globalassets/global/gwp-cee_files/regional/rethinking-water-security-ukraine-2016.pdf) (accessed 22 March 2020).
- GWP Ukraine (2017). *Results of stakeholder meeting 'Progress indicators and water targets for Ukraine'*, 7 July 2017. Available at: <https://www.facebook.com/GWPUA>, <https://drive.google.com/open?id=1QK-TuCLKBoRFJErqbNN2tEdvqvjCtCux> (accessed 22 March 2020).
- GWP Ukraine (2019). *Report on Assessing the Degree of Implementation of Global SDGs 6, 6.1, 6.2, 6.3, 6.4, 6.5, 6.b, 13.1 in Strategic Ukrainian Documents*. Available at: <https://www.facebook.com/GWPUA>, [https://drive.google.com/file/d/1OXN-BES4EKewyAGpBcGTiD\\_eQnWA-K0Zi/view?usp=sharing](https://drive.google.com/file/d/1OXN-BES4EKewyAGpBcGTiD_eQnWA-K0Zi/view?usp=sharing) (accessed 22 March 2020).
- Jönch-Clausen, T. (2004). *Integrated Water Resources Management (IWRM) and Water Efficiency Plans by 2005*. Global Water Partnership (GWP) Technical Committee Background Papers No. 10. GWP, Stockholm, Sweden. Available at: <https://www.gwp.org/globalassets/global/toolbox/publications/background-papers/10-iwrm-and-water-efficiency-plans-by-2005.-why-what-and-how-2004.pdf> (accessed 22 March 2020).
- Mendoza, G., Jeuken, A., Matthews, J., Stakhiv, E., Kucharski, J. & Gilroy, K. (2018). *Climate Risk Informed Decision Analysis (CRIDA): Collaborative Water Resources Planning for an Uncertain Future*. UNESCO International Centre for Integrated Water Resources Management, Paris, France.
- Meuleman, L. (2020). *It Takes More Than Markets: First Governance Lessons From the COVID-19 Pandemic*. IISD. Available at: <http://sdg.iisd.org/commentary/guest-articles/it-takes-more-than-markets-first-governance-lessons-from-the-covid-19-pandemic/> (accessed 9 April 2020).
- OECD (2011). *Water Governance in OECD Countries: A Multi-Level Approach*. OECD Publishing, Paris, France. <https://doi.org/10.1787/9789264119284-en> (accessed 22 March 2020).
- OECD (2013). *Water Security for Better Lives*. OECD Publishing, Paris, France. <https://doi.org/10.1787/9789264202405-en> (accessed 22 March 2020).
- OECD (2015). *OECD Principles on Water Governance*. OECD Publishing, Paris, France. Available at: <http://www.oecd.org/gov/regional-policy/OECDPrinciples-on-Water-Governance-brochure.pdf> (accessed 22 March 2020).
- President of Ukraine (2019). *Decree of the President of Ukraine 'On Sustainable Development Goals of Ukraine until 2030'*, No. 722/2019, 30.09.2019. Available at: <https://www.president.gov.ua/documents/7222019-29825> (accessed 22 March 2020).
- Ray, P. & Brown, C. (2015). *Confronting Climate Uncertainty in Water Resources Planning and Project Design: The Decision Tree Framework*. World Bank, Washington, DC, USA. <https://doi.org/10.1596/978-1-4648-0477-9> (accessed 9 April 2020).
- Shah, T. (2016). *Increasing Water Security: The Key to Implement the Sustainable Development Goals*. Global Water Partnership (GWP) Technical Committee Background Papers No. 22. GWP, Stockholm, Sweden. Available at: [https://www.gwp.org/globalassets/global/toolbox/publications/background-papers/gwp\\_tec22\\_web.pdf](https://www.gwp.org/globalassets/global/toolbox/publications/background-papers/gwp_tec22_web.pdf) (accessed 22 March 2020).
- Ukrainian Parliament (2019). *The Law of Ukraine 'On basic principles (strategy) of state environmental policy of Ukraine until 2030'*, No. 2697-VIII, 28.02.2019. Available at: <https://zakon.rada.gov.ua/laws/show/2697-19> (accessed 22 March 2020).
- Ukrainian Parliament (2020). *Water Code of Ukraine*, No. 554-IX, 13.04.2020. Available at: <https://zakon.rada.gov.ua/laws/show/213/95-%D0%B2%D1%80#Text> (accessed 22 June 2020).
- UN (2002). *World Summit on Sustainable Development, Draft plan of implementation of the World Summit on Sustainable Development. A/CONF.199/L.1 (26 June 2002), para.25*. United Nations. Available at: [https://www.undocs.org/en/%20A/CONF.199/L.1%20\(ENG/RUS\)](https://www.undocs.org/en/%20A/CONF.199/L.1%20(ENG/RUS)) (accessed 22 March 2020).
- UN (2015). *Цель 6: Обеспечение наличия и рационального использования водных ресурсов и санитарии для всех (Goal 6: Ensure availability and sustainable management of water and sanitation for all)*. United Nations. Available at: <https://www.un.org/sustainabledevelopment/ru/water-and-sanitation/> (accessed 22 March 2020).
- UN Environment (2018). *Progress on Integrated Water Resources Management – Global Baseline for SDG 6.5.1. Indicator – Degree of IWRM Implementation*. UN-Water. Available at: <http://www.unwater.org/publications/progress-on-integrated-water-resources-management-651/> (accessed 22 March 2020).
- UNISDR (2015). *Sendai Framework for Disaster Risk Reduction 2015–2030. UNISDR/GE/2015*. United Nations International Strategy for Disaster Reduction. Available at: [http://www.wcdrr.org/uploads/Sendai\\_Framework\\_for\\_Disaster\\_Risk\\_Reduction\\_2015-2030.pdf](http://www.wcdrr.org/uploads/Sendai_Framework_for_Disaster_Risk_Reduction_2015-2030.pdf) (accessed 22 March 2020).
- Woodhouse, P. & Muller, M. (2017). *Water governance – an historical perspective on current debates*. *World Development* 92, 225–241. <http://dx.doi.org/10.1016/j.worlddev.2016.11.014> (accessed 22 March 2020).

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