

Overview of Water Policy Developments: Pre- and Post-2015 Development Agenda

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Abstract The year 2015 marked the end of some important universal decisions regarding water developments. The International Decade for Action ‘Water for Life’ (2005–2015) was concluded so that a “Post-2015 Development Agenda” is now defined. 2015 was also the year when UN Millenium Goals (MDGs) came to an end to convert into the new Agenda, which is a process led by the United Nations (UN) to define the future global development framework. The proposed goal is now referred to as SDG’s or Sustainable Development Goals, that extend existing commitments such as the MDGs and the priorities of Rio + 20. SDG’s will balance the economic, social and environmental dimensions of sustainable development with a strong linkage between environment and socio-economic goals. They converge with the post-2015 development agenda, now called Agenda 30 as these goals will be valid until 2030. One of the major concepts of SDG’s is water security, which is the basic element of the Global Goal on Water. Water security is the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality of water for sustaining livelihoods, human well-being, and socioeconomic development, for ensuring protection against pollution and waterrelated disasters, and for preserving ecosystems in a climate of peace and political stability. This paper discusses the developments in water management within the last 30 years, which eventually led to the above concepts. A summary is provided on key events and documents of these past years to point out how the international community has reacted towards present and emerging needs of the society.

Keywords Water management · Post-2015 development agenda · Sustainable development goals · Water security · Water allocation · Global goal on water

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1 Introduction

The key concepts within the last 25 years in water management have been sustainability, holistic approach to management, and integrated water management and protection. Yet, the story goes back some more years to late 70s as there had been a gradual change in our conceptualization of the environment. This change occurred due to a parallel evolution in the nature and scale of environmental problems experienced. Until the second half of the 70's, the majority of the problems we faced were of a local nature. In time, environmental pollution adopted a spatial nature, ranging from regional problems to the recent ones of a global nature.

On the other hand, each problem had often been considered to be specific to a particular component of the environment (i.e., air, water, soil, etc.) so that these components were treated independently of each other. In mid-80's, however, environment is recognized to be a "continuum" of air, soil, and water components, which are vital for sustaining life on earth. These components interact in a number of complex ways so that any intervention imposed on one of these components produces effects that propagate to the others. It is this interactive nature of environmental processes that led to the development of a new approach to environmental management, namely that the environment must be managed and protected as a cohesive whole (Singh 1995). This means that all components of the environment and their interactions must be accounted for, considering both their temporal and spatial dimensions. As such, management of the environment requires multidisciplinary and inter-organizational approaches. These requirements set the basis for what was then described as "integrated environmental management (Harmancioglu et al. 1998). Accordingly, water management was considered as an important component of environmental management as water is essentially a part of the environmental continuum.

Besides the recognition of the "environmental continuum" concept and changes in the scale of problems experienced, there had been other developments in terms of environmental pollution that necessitated an integrated approach to management. Due to rapid population growth, urbanization, industrial and agricultural development, water scarcity had become a significant problem in most parts of the world. The quality of surface waters, aquifers and coastal zones was continuously degrading throughout the world. These developments led to significant concern over the slow rate of progress towards the sustainable use and development of water resources for health, food production, and income generation. Overuse or misuse of land resources resulted in land degradation, particularly in the form of deforestation, and desertification. All these problems gradually led to physical or ecological degradation of physical habitat for biodiversity. There were further environmental challenges due to ozone depletion and climate change which still affect various components in a number of interactive ways (Tyson 1995; Harmancioglu et al. 1998).

All the above problems have stemmed from unsustainable exploitation of living and nonliving resources, and the result is the alarming environmental crisis we live in today. An important feature of this crisis is that it has grown in dimensions from local levels to regional, international and global scales. These developments have eventually led to the consideration of "sustainable development" as the basic philosophy to be adopted in exploitation and management of natural resources. At first, "sustainability" had indeed been a philosophy until the UN (United Nations) Conference on Environment and Development held in Rio de Janeiro in 1992. At this Earth Summit, the integration of environmental issues into economic and developmental decision making was foreseen, and "sustainability" was formulated as a management strategy.

Before discussing the key events that have shaped water management policies up to recent times, we may mention two conferences that precede even the Rio Congress of 1992. The 1972 “UN Conference on the Human Environment” held in Stockholm was probably one of the first meetings to focus on preservation and enhancement of the human environment (Harmancioglu 2014). This was followed by the 1977 “UN Conference on Water, Mar del Plata” which resulted in the Mar del Plata Action Plan (MPAP) as the key document. This plan focused on assessment of water resources, water use and efficiency, and water resources systematic measurement.

The following section continues with milestone events and key documents, starting in early 80s, but particularly developing in the 90s and leading to the final Global Goal on Water of our times.

2 Milestones in Water Policy Development within the Last 30 Years

Early 80s started with the declaration of the “International Drinking Water and Sanitation Decade” (1981–1990). The idea here was that, although countries failed to meet quantitative goals, they also realized the importance of comprehensive and balanced country-specific approaches to the water and sanitation problem (Harmancioglu 2014).

The year 1990 marks the end of the “International Drinking Water and Sanitation Decade” (1981–1990) and the beginning of the “International Decade for Natural Disaster Reduction” (1990–2000). The first major event starting within this decade was the “International Conference on Water and Environment, Dublin, 1992, ICWE 2992” which resulted in “the Dublin Statement on Water and Sustainable Development” (WMO 1992). The Dublin Conference focused on the economic value of water, women, poverty, resolving conflicts, natural disasters, and awareness on water problems. The resulting Dublin Statement stressed 4 basic principles with the highlighted keywords:

1. “Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment”.
2. “Water development and management should be based on a *participatory approach*, involving users, planners and policy-makers at all levels”..
3. “*Women play a central part* in the provision, management and safeguarding of water”
4. “Water has an *economic value* in all its competing uses and should be recognized as an *economic good*”.

The key event of the last 30 years was the “UN Conference on Environment and Development (UNCED Earth Summit), Rio de Janeiro (1992) (UNCED 1992), which set forth significant concepts in water policy that are still valid today. The Conference covered the following topics: cooperation in environmental management, water economics, participatory approach, drinking water and sanitation, human settlements, sustainable development, food production, and climate change. The Conference ended with the Rio Declaration, which stressed “establishing a new and equitable global partnership through the creation of new levels of cooperation among States, key sector societies and people”. The major output of the Rio Conference was the famous Agenda 21 (UN 1992), which has shaped water policies within the last 25 years and which is still valid today. In particular, Chapter 18 Section 2 of the Agenda relates to water resources and states that “the holistic management of freshwater ... and

the integration of sectoral water plans and programmes within the framework of national economic and social policy, are of paramount importance for action in the 1990s and beyond. The two major concepts conveyed by Agenda 21 are the following:

- a) *environment is recognized to be a “continuum”* of air, soil, and water components, which interact in a number of complex ways; thus, the environment must be managed and protected as a *cohesive system*.
- b) integration of environmental issues into economic and developmental decision making was foreseen, and “*sustainability*” was formulated as a management strategy.

The Rio Conference was followed by another UN event: “UN International Conference on Population and Development, Cairo, 1994”, which again stressed, “ensuring that population, environmental and poverty eradication factors are integrated in sustainable development policies, plans and programmes”. In particular, Chapter III of the resulting document focused on “Interrelationships between population, sustained economic growth and sustainable development, C- Population and Environment, Programme of Action” (UN 1994).

The Rio Conference was then succeeded by 10-year Earth Summits of the same nature to evaluate whether the objectives of Agenda 21 were realized or not. The first of these meetings was the “World Summit on Sustainable development, Rio+10, Johannesburg, 2002”, where unfortunately it was concluded that countries were not successful in meeting the Agenda 21 goals. Thus, new decisions were formulated as part of a “Plan of Implementation” as the resulting document of Rio + 10 (UN 2002). The Plan stated: “We agree to halve, by the year 2015 (...) the proportion of people who do not have access to basic sanitation, which would include actions at all levels to:

- Develop and implement efficient household sanitation systems,
- Improve sanitation in public institutions, especially schools,
- Promote safe hygiene practices,
- Promote education and outreach focused on children, as agents of behavioral change,
- Promote affordable and socially and culturally acceptable technologies and practices,
- Develop innovative financing and partnership mechanisms,
- Integrate sanitation into water resources management strategies.

The next Earth Summit was again organized in Rio, this time to focus majorly on sustainability: the United Nations Conference on Sustainable Development (UNCSD), Rio + 20, 2012 (UN 2012). The principle outcome of the Summit was: the call to produce a set of universally applicable sustainable development goals (SDGs) that balance the environmental, social and economic dimensions of sustainable development. It is noted here that the SDGs must build upon the Millenium Development Goals (MDGs) of 2000 and converge with the post-2015 development agenda.

Certainly, MGDs initiated new goals and perspectives for the twenty-first century, covering not only environmental management but also other global problems such as poverty and hunger, education, gender equality and health. These goals were announced by the “UN Millenium Declaration of 2000” (UN 2000). The Declaration covered 8 MDGs to be achieved by all 189 United Nations Member States by 2015. In particular, 7th and 8th Goals relate to sustainable environmental, and hence, water management:

7th Goal:

- Integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources;
- Reduce by half the proportion of people without sustainable access to safe drinking water;

8th Goal:

- Develop a global partnership for development (commitment to good governance, development and poverty reduction).
- “UN Millenium Declaration of 2000” essentially started a new era in terms of water policies for the years between 2000 and 2015.

Another important water event was held in Hague in 2000, which produced the “Ministerial Declaration on Water Security in the 21st Century 2000, WWC, Hague” (WWC 2000). This meeting was among the first events to focus on water security and defined 7 challenges: Meeting basic needs, Securing the food supply, Protecting ecosystems, Sharing water resources, Managing risks, Valuing water, and Governing water wisely.

3 Other Global Water Events of the Last 30 Years

3.1 UN Organizations Active in Water Policy Development

The year 1990 marks the end of the “International Drinking Water and Sanitation Decade” (1981–1990) and the beginning of the “International Decade for Natural Disaster Reduction” (1990–2000), finally leading to the MDGs of 2000. Other global water events were similarly organized by UN, particularly by UNESCO (the United Nations Educational, Scientific and Cultural Organization). Among the various themes UNESCO covers is “Science for a Sustainable Future”, that relates as well to water issues and notes that: “Water is fundamental for life and ensuring water security for communities worldwide is essential to peace and sustainable development. The scientific understanding of the water cycle, the distribution and characteristics of surface and groundwater, of urban water all contribute to the wise management of freshwater for a healthy environment and to respond to human needs” (<http://en.unesco.org/themes/science-sustainable-future>). It is also stressed here that “As no one country can achieve sustainable development alone, international scientific cooperation contributes, not only to scientific knowledge but also to building peace”.

Under the above theme, the Natural Sciences Sector of UNESCO elaborates into different areas again, one of them being the Environment where water is studied by such programmes as IHP, IHP-VIII, WWAP, UNESCO-IHE, Water Centres and Water Chairs (<http://www.unesco.org/new/en/natural-sciences/environment/>).

Another active UN organization is UN-Water (the United Nations Inter-Agency Mechanism on All Freshwater Related Issues, Including Sanitation) (<http://www.unwater.org/about/>). UN-Water was established in 2003 by the United Nations High Level Committee on Programmes to provide: “... the platform to address the cross-cutting nature of water and maximize system-wide coordinated action and coherence”. As a start, it was formulated to coordinate “...UN system actions aimed at the implementation of the agenda defined by the Millennium

Declaration and the World Summit on Sustainable Development as it relates to its scope of work”. Since then, UN-water has continued to focus on all major water issues such as (<http://www.unwater.org/about/>):

- Freshwater resources - both in terms of their quality and quantity, their development, assessment, management, monitoring and use;
- Sanitation - both access to and use of sanitation by populations and the interactions between sanitation and freshwater;
- Water-related disasters, emergencies and other extreme events and their impact on human security.

3.2 World Water Development Reports

The UN World Water Assessment Programme (WWAP) of UNESCO (<http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/about/>) acts to coordinate the 31 members and partners of UN-Water in producing the World Water Development Reports (WWDR), which are key to policy developments in the water area.

The first WWDR1 was issued in 2003 under the title “Water for People, Water for Life” (WWAP 2003). Following right after the Millenium Declaration and the Johannesburg Plan of Implementation, this report stressed the following:

- The world’s available freshwater must be shared among individuals, economic sectors, intrastate jurisdictions and sovereign nations, while respecting the need for environmental sustainability.
- Agenda 21 Action Plan called upon the international community to recognize the multisector nature of water resources and to holistically manage the resource within and across national boundaries.
- New laws and regulations reinforced Integrated Water Resources Management (*IWRM*) techniques (*SUPPLY AND DEMAND MANAGEMENT*).

Other issues discussed in this first detailed WWDR1 were:

1. ‘Virtual water’, which recognizes the sharing of water resources between water-rich and water-poor countries
2. National-level strategies and/or legislation on intersectoral allocation, which may be based on:
 - Catchment socio-economic priorities
 - Legislatively predefined priorities (including reserves for human consumption and environment), and
 - Demand management targeted at certain sectors in priority.
 - Harmonization of sectoral policies and laws.
 - Tariff disincentives and targeted subsidies as an economic influence on sharing through pricing differentials for different purposes.
 - Abstraction management (issuance of permits/licences) to limit water use for particular purposes or during particular seasons.

- River water quality objectives, which through discharge/treatment/quality standards, ensure water of quality fit for downstream purposes.
- Optimized reservoir operating rules, multi-reservoir system management (optimized to meet different demands) and reservoir compensation flow releases.

WWDR2 of 2006 (WWAP 2006), entitled “Water, a Shared Responsibility”, stressed the following issues:

Demand Management: The process of using water more efficiently and fairly, improving the balance between present supplies and demand, and reducing excessive use.

Water Rights: Well-defined and coherent water rights are fundamental to dealing with increased competition between water users.

Water Allocation: ‘priority in the allocation of water must be given to the right to water for personal and domestic uses’: Irrigation: %70; Industry: %20; Domestic: %10. Clear and flexible criteria for water allocations and quality: water allocations, which are often at the heart of most water disputes, are a function of water quantity and quality, as well as political fiat.

Effective institutions must therefore identify clear allocation schedules and water quality standards, which simultaneously provide for extreme hydrological events, new understandings of basin dynamics, and changing societal values and aquatic ecosystem needs.

The first WWDR1 “Water for People, Water for Life” was presented at the 3rd World Water Forum in Japan in 2003, and “Water: A Shared Responsibility” (WWDR2), presented in 2006 at the 4th World Water Forum in Mexico. The 5th World Water Forum in Istanbul, Turkey witnessed the issuance of the WWDR3 on “Water in a Changing World”. Yet, it is indicated in this report (WWAP 2009) that WWDR3 is a little different from the first two reports: “the third Report has a new, holistic format. A number of themes are addressed throughout the report, including climate change, the Millennium Development Goals (MDGs), groundwater, biodiversity, water and migration, water and infrastructure, biofuels, etc.” The report focuses more on water management, legislation, societal and economic issues, water allocation, sustainability and climate change. The major decisions covered are (WWAP 2009):

- Competition for water and shortcomings in managing it to meet the needs of society and the environment call for enhanced societal responses through improved management, better legislation and more effective allocation mechanisms.
- Water management choices should emerge from informed consultation and negotiation on the costs and benefits of all options after considering basin interconnectedness, relationships between land and water resources, and the consistency of decisions with other government policies.
- Sectoral conflicts oppose users from different sectors (domestic, hydropower, irrigation, industries, recreation, etc), including ecosystems, whose sustainability depends on environmental flows.
- These conflicts are both economic, social and political. Large improvements are expected from demand management, with savings in water, energy and money through increased efficiency.
- Responses outside the water domain are paramount in influencing the macro changes in how water is used and allocated to make adaptation to the water domain more effective, better integrated and less costly.

- Population growth, urbanization and climate change are forcing the water domain to adapt.
- Broader policy change and political action are required to change fundamental allocations and uses of water.
- Effectively managing competing water uses requires clear, widely accepted rules on allocating water resources, especially under conditions of scarcity, to balance equity and economic efficiency.
- One means of avoiding conflicts of interests in water legislature is to separate policy, regulation and implementation functions.
- There are many shortcomings in how water is managed today in terms of increased scarcity: low efficiency, environmental degradation, and inequity. Despite some improvements, competition is increasing and water use efficiency remains low in most sectors.
- Furthermore, more emphasis is needed on greater yields and productivity, because these alone may lead to further losses in equity and environmental sustainability.
- Rather, a combination of supply and demand management measures is needed.

The most recent WWDR of 2017 is issued for the World Water Day, March 22 2017, under the title: “Wastewater, The Untapped Resource”. This report focuses on “on 'Wastewater' and seeks to inform policy- and decision-makers, inside and outside the water community, about the importance of managing wastewater as a resource, an undervalued and sustainable source of water, energy, nutrients and other recoverable by-products, rather than something to be disposed of or a nuisance to be ignored”. The report shows that “improved wastewater management is as much about reducing pollution at the source, as removing contaminants from wastewater flows, reusing reclaimed water and recovering useful by-products. Together, these four actions generate social, environmental and economic benefits for all society, contributing to overall well-being and health, water and food security, and sustainable development” (<http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/>). This theme is considered as an essential issue to be addressed in the 2030 Agenda.

3.3 World Water Forums

The World Water Forum is another water related event, hosted by the World Water Council (<http://www.worldwatercouncil.org/>) and organized every three years. The purposes of World Water Forum are to (<http://www.worldwatercouncil.org/>):

- *Raise awareness with decision makers and the public on water issues and to generate action;*
- *Contribute to improving access to water supply and sanitation and report on progress towards meeting the Millennium Development Goals;*
- *Provide opportunities to progressively develop shared visions on challenging water issues, to develop new partnerships and to facilitate cooperation and action among a wide diversity of organizations and individuals;*
- *To encourage the privatization of public water and sewer systems.*

The first World Water Forum was organized in Marrakech in 1997 under the theme "Vision for Water, Life and the Environment". In the resulting Marrakech Declaration, decisions were made "... to recognize the basic human needs to have access to clean water and sanitation, to

establish an effective mechanism for management of shared waters, to support and preserve ecosystems, to encourage the efficient use of water.” (WWC 1997).

The second World Water Forum was held in The Hague in 2000 with the theme “From Vision to Action” and proposed to:

- Involve all stakeholders in integrated management,
- Move to full-cost pricing of water services,
- Increase public funding for research and innovation,
- Increase cooperation in international water basins,
- Massively increase investments in water.

“Ministerial Declaration of The Hague on Water Security in the 21st Century” and “World Water Vision” are the two output documents of the forum (WWC 2000).

2003 was announced as the International Year of Freshwater and coincided with the 3rd World Water Forum in Kyoto, Japan. This forum also focused on such issues as governance, IWRM, gender, pro-poor policies, financing, cooperation, capacity-building, water use efficiency, water pollution prevention, and disaster mitigation. It also foresaw the participation of ingenious people and their rights in developing water policies (https://en.wikipedia.org/wiki/World_Water_Forum).

The next two years marked the beginning of important decades related to water issues of the time:

- *Beginning of the Decade of “Education for Sustainable Development” (2005–2014)*
- *Beginning of the International Decade for Action “Water for Life” (2005–2015)*

The 2nd World Water Development Report (WWAP 2006) was presented at the 4th World Water Forum in Mexico in 2006. The main issues of this forum were: water for growth and development, Implementing IWRM, water supply and sanitation for all, water management for food and the environment, risk management, responsibility of governments, and increased financial commitments.

In the 5th World Water Forum of Istanbul in 2009, it was declared that, regardless of whether or not the MDG’s are achieved, after 2015, the remaining half of the population will still need to be served. At the 5th World Water Forum, the main obstacles to reaching the MDGs were identified as a lack of effective management, investment, institutional capacity and political priority. The two main output documents of the forum were: “Water at a Crossroads” (WWC 2009a) and “Global Water Framework” (WWC 2009b).

The 6th World Water Forum was held in Marseille, France, in 2012 for a discussion of topics ranging from transboundary water management to green growth and climate change as well as food security. WWC comments on this forum as: “The political involvement had never been as important, specifically the contributions and commitments made from local governments and parliamentarians, to either improve their practices by signing the Istanbul Water Consensus or making the right to water a legal reality” (<http://www.worldwatercouncil.org/>).

The 7th World Water Forum was organized in Daegu & Gyeongbuk, Republic of Korea, in 2015, which was an important year to mark the end of MDGs and a shift to SDGs. Thus, it facilitated a thorough discussion of SDGs (Sustainable Development Goals) and beyond. Under the theme “Water for Our Future”, it focused on how we can better towards a “water

secure world”. In the synthesis report of the forum, it is stated that (http://www.worldwatercouncil.org/fileadmin/world_water_council/documents/world_water_forum_7/): “*The World Water Council ... convened a High-Level Panel on the role of water in the post-2015 development agenda. This panel discussed how to ensure the inclusion of water-related Goals and Targets in the SDG framework, but also what elements are necessary for their successful implementation and monitoring in the coming 15 years. WWC urged policy makers and water stakeholders from all nations to maintain the momentum for a dedicated Sustainable Development Goal for water in order to achieve water security in all domains*”. The major themes were then noted as in this synthesis report:

1. *Water Security for All*
 - 1.1. Enough Safer Water for All
 - 1.2. Integrated Sanitation for All
 - 1.3. Adapting to Change: Managing Risk and Uncertainty for Resilience and Disaster Preparedness
 - 1.4. Infrastructure for Sustainable Water Resource Management and Services
2. *Water for Development and Prosperity*
 - 2.1. Water for Food
 - 2.2. Water and Energy
 - 2.3. Water and Cities
3. *Water for Sustainability: Harmonizing Humans and Nature*
 - 3.1. Green Growth, Water Stewardship and Industry
 - 3.2. Managing and Restoring Ecosystems for Water Services and Biodiversity
 - 3.3. Ensuring Water Quality from Ridge to Reef
 - 3.4. SMART Implementation of IWRM
4. *Constructing Feasible Implementation Mechanisms*
 - 4.1. Economics and Financing for Innovative Investments
 - 4.2. Effective Governance: Enhanced Political Decisions, Stakeholder Participation and Technical Information
 - 4.3. Cooperation for Reducing Conflict and Improving Transboundary Water Management
 - 4.4. Water Cultures, Justice and Equity
 - 4.5. Enhancing Education and Capacity Building

Essentially, it was the UN Conference on Sustainable Development (UNCSD), Rio + 20, 2012 (UN 2012), mentioned earlier in Section 2 of this paper, that led to the above themes. Thus, the 7th World Water Forum marked the end of MDGs and the start of SDGs to converge with the *post-2015 development agenda*. We must note here that the SDGs stressed in Rio + 20 are expected to (UN 2012):

- Be based on Agenda 21 and the Johannesburg Plan of Implementation.
- Fully respect all the Rio Principles.
- Be consistent with international law.
- Build upon commitments already made.

- Contribute to the full implementation of the outcomes of all major summits in the economic, social and environmental fields.
- Address and incorporate in a balanced way all three dimensions of sustainable development and their interlinkages.
- Be coherent with and integrated into the UN development agenda beyond 2015.
- Not divert focus or effort from the achievement of the MDGs.
- Focus on priority areas for the achievement of sustainable development.
- Include active involvement of all relevant stakeholders.

4 Post-2015 Development Agenda

4.1 Development of the 2030 Agenda

Officially, the Post-2015 Development Agenda is process led by UN to help define the future global development framework, that will extend from 2015 to 2030. Thus, the Agenda is also called the 2030 Agenda for Sustainable Development. In this regard, 2015 was an important year to end the MDG era and start a new development framework based on SDGs.

Efforts towards developing a Post-2015 Development Agenda were initiated in 2010 at the Millennium Summit in New York, where the UN Secretary General was requested to start “the process of a follow-up to the MDGs”. Next, at the Rio + 20 Summit in 2012, “*the commitment to formulate a number of goals on sustainable development was clear, along with an acknowledgement of the central role that water and sanitation play in sustainable development*” (UN-Water 2015).

Since Rio + 20, the UN system and particularly UN-Water, in addition to many non-UN organizations, have been working to develop “...a coherent post2015 goal for sustainable development that would expand and improve upon the MDG era, to take the entire water cycle into account..” (UN-Water 2015). For a Post-2015 goal for sustainable development by 2030, UN-Water proposed a goal that builds on and extends existing commitments such as the MDGs and the priorities agreed at Rio + 20. “The goal will provide an overall framework that is universally applicable, but that responds to particular national circumstances and addresses account costs, benefits and means of implementation. The framework, with a clear set of targets and indicators, can be tailored to the context and priorities of each country” (<http://www.unwater.org/sdgs/en/>). In developing the 2030 Agenda, the vital role of water in social, economic and environmental dimensions of sustainability was recognized as a sound starting point so that efforts were initiated to define a Post-2015 Global Goal for Water.

4.2 Post-2015 Global Goal for Water

UN-Water and other contributors within the UN System suggested that the Global Goal for Water should be: “*Securing Sustainable Water for All*” (UN-Water, 2014). Figure 1 shows this global goal and how other water issues relate to it. UN-Water (2014) claimed that “*The framework for this global goal for water is designed to promote human well-being, economic prosperity and the preservation of environmental capital. The framework thus contains all three dimensions of sustainable development - social, economic and environmental.*” This report also summarizes, as in Fig. 2., the expected results to be achieved by the related issues of the global goal.

Fig. 1 Global goal for water and the related water issues (UN-Water 2014)

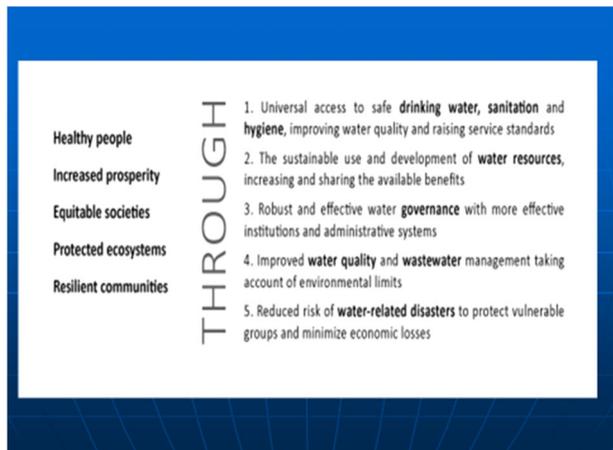


Essentially, the global goal and its associated issues as in Figs. 1 and 2 coincide with the major themes reported in the 7th World Water Forum (Section 3.3 of this paper), which is the concluding event of the 2000–2015 era. The proposal for a Global Goal for Water is also associated with targets and indicators to help countries reach the goal by 2030. The related water issues in Fig. 1 are actually the main targets. UN-Water (www.unwater.org) further suggests means of implementation of the costs and their benefits/costs. The five main targets are summarized below. Particularly in Targets A and C, the words “water allocation” are inserted as they relate to the water allocation issue as a support of water security, as it will be discussed further in paper.

TARGET A: Achieve universal access to safe drinking water, sanitation and hygiene (Water Allocation)

1. *Element 2: Basic Access:* “to achieve universal access to basic drinking water, sanitation and hygiene”

Fig. 2 Expected results of the suggested Global goal for water (UN-Water 2014)



2. *Element 4: Equality*: “to progressively eliminate inequalities in access”

TARGET B: Improve by (x %) the sustainable use and development of water resources in all countries

TARGET C: All countries strengthen equitable, participatory and accountable water governance (*Water Allocation*)

1. *Element 1*: Implement integrated approaches to water management at local, basin and national levels including participatory decision-making
2. *Element 2*: Deliver all drinking water supply, sanitation and hygiene services in a progressively affordable, accountable, and financially and environmentally sustainable manner
3. *Element 3*: Ensure regulatory frameworks are in place for water resources, infrastructure and services and enhance the performance of responsible public authorities and their water operators

TARGET D: Reduce untreated wastewater by (x %), nutrient pollution by (y%) and increase wastewater reuse by (z%)

TARGET E: Reduce mortality by (x %) and economic loss by (y%) from natural and human-induced water-related disasters.

In evaluating the proposed Global Goal for Water, UN-Water (2014) stresses that “*It is increasingly obvious that the current use, development and management of the planet’s finite water resources, and the services they provide, is unsustainable. At the United Nations Conference on Sustainable Development in 2012 (Rio+20), governments recognized that water is “at the core of sustainable development as it is closely linked to a number of key global challenges”. Achieving the development objectives of ending poverty, overcoming inequalities, realizing human rights for all and boosting and sustaining economic development is reliant upon healthy freshwater systems. The proposed global goal for water addresses the priorities agreed at Rio + 20 and in other intergovernmental processes. It draws on lessons learnt from the MDGs, the unfinished business of implementing the MDG agenda, and on outputs from global, national and regional stakeholder consultations.*”

4.3 Water Security

4.3.1 Working Definition of Water Security

Water security has long been in the agenda of the international water community. For instance, it was the main theme of the Hague 2nd World Water Forum in 2000; in fact, the “Ministerial Declaration of The Hague on Water Security in the 21st Century” was one of the major output documents of the Forum (WWC, 2000). Yet, the problem was that organizations could not reach a consensus on a sound definition of water security that would reflect the role of water in other global sustainability problems (e.g., social, economic, poverty, hunger and the similar). The development of the Post-2015 Development Agenda required a solution to this problem, and finally, UN-Water (2013) announced a working definition as (<http://www.unwater.org/topics/water-security/en/>):

Water security is ... the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne

pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability.

This definition “covers complex and interconnected challenges and highlights water’s centrality for achieving a larger sense of security, sustainability, development and human well-being.”(UN-Water 2013). This report also stresses that many factors which are outside the “water realm” affect water security, including biophysical, infrastructural, institutional, political, social and financial factors and the similar. Furthermore, water may be both productive and destructive. It is productive in the sense that it is a source of health, growth, production, cooperation, and development. It is also destructive in the form of floods and related disasters, poverty and disputes over water rights. In developing the above working definition of water security, all these factors are considered so that it addresses both the:

- Availability of acceptable quantity & quality of water for health, livelihoods, ecosystems & production and development; and
- Acceptable level of waterrelated risks to people, environments & economies

Within the 2000–2015 era, the central role of water in reaching the the MDGs were not sufficiently addressed although its link to sustainable development was recognized. This time UN-Water and related organizations (UN-Water 2013; <http://www.unwater.org/topics/water-security/en/>) stressed that “...*Water security must therefore figure prominently in SDGs and the post-2015 development framework, including through the setting of targets and indicators that reflect water’s cross-cutting value to food, energy, and other priority development areas... Addressing this goal requires interdisciplinary collaboration across sectors, communities and political borders, so that the competition or potential conflicts can be handled*”. Accordingly, the Post-2015 Development Agenda is based on the Global Goal for Water encompassing the working definition of Water Security above as these concepts “will address multiple priority development areas under consideration: conflict and fragility; environmental sustainability; growth and employment; health, hunger, food and nutrition; inequities; energy; and WATER” (UN-Water 2013; UNESCO 2013). In essence, water security needs to be included in the formulation of the Sustainable Development Goals (SDGs).

4.3.2 The Role of Water in a Larger Context of Security: Water-Food-Energy Security Nexus

Just as water is considered as the core element of sustainable development, water security also lies at the center of many security areas, each of which is intricately linked to water. Thus, we consider the following areas to be related to water security (UN-Water 2013; WWAP 2014; UN-Water 2015):

- *Human security*: a good level of health and well-being, adequate and safe food, a secure and healthy environment, means to a secure livelihood, and protection and fulfillment of fundamental rights and liberties.
- *Food security*
- *Energy security*
- *Economic security*
- *Environmental security*

These areas share some common properties such as:

- billions of people without access to them;
- there is rapidly growing global demand for each;
- each faces resource constraints;
- each depends upon healthy ecosystems;
- each is a global good with trade implications;
- each has different regional availability and variations in supply and demand; and
- each operates in heavily regulated markets.

Food security and energy security generally mean reliable access to sufficient supplies of food or energy, to meet basic needs of individuals, societies, and nations, thus supporting lives, livelihoods and production. In essence, “water security” has an equivalent meaning. This link between water, food and energy is referred to as the “Water-Food-Energy Security Nexus” and is an important issue of the Post-2015 Development Agenda (UN-Water 2013; WWP 2014; UN-Water 2015).

4.4 Water Allocation as an Efficient Mechanism to Support Water Security

It was noted in Section 4.2. on Post-2015 Global Goal for Water that, among the five targets identified, Targets A and C relate to water allocation as an important mechanism to achieve water security. *Equitable allocation* of water resources has been in focus within the last decades due to such factors as (Le Quesne et al. 2007):

- Increasing *complexity* due to population growth, development pressures, and changing needs;
- *Unequal distribution* of water due to political changes, resource mismanagement, and climatic anomalies and thus water scarcity.
- *Increased competition among uses and users*, requiring more effective negotiation and allocation mechanisms.

Speed et al. (2013) define water allocation as “*the process of sharing a limited natural resource between different regions and competing users. It is a process made necessary when the natural distribution and availability of water fails to meet the needs of all water users – in terms of quantity, quality, timing of availability, or reliability. In simple terms, it is the mechanism for determining who can take water, how much they can take, from which locations, when, and for what purpose*”. It is also noted by Speed et al.(2013) and Le Quesne et al.(2007) that “*As water scarcity has increased globally, water allocation plans and agreements have taken on increasing significance in resolving international, regional and local conflicts over access to water. With water now a limiting factor to food production and economic growth, a vital input to power generation, and with the rapid decline in the health of aquatic ecosystems, how water is allocated has taken on increasing significance*”. Efficient allocation of water resources requires:

- A sound planning of water resources, evaluation of supply versus demand;
- Consideration of the past/present allocation status or storage expansion in existing reservoirs;
- Better assessment and improvement of water demand;
- More focus on the balance between equity and efficiency of use;
- If required, revision of inadequate legislative and institutional frameworks.

The traditional approach in meeting the increasing water demand has often been to construct new infrastructure, which is the case in many developing countries. Speed et al. (2013) suggest a modern approach based on:

- *Optimization of the use of existing supplies through significant economic, social and environmental analyses and the assessment of tradeoffs between competing users.*
- *Adoption of demand management measures.*
- *A better balance between rights to take water and protection of the environment.*
- *Sophisticated, risk-based environmental flow assessments.*
- *Understanding of the value of water and the demands of water users.*
- *Greater flexibility in the way water is allocated: in recognition of the significant uncertainty associated with changes in climate, economies and demographics, and the need for water allocation systems to respond to these changes.*
- *A better understanding of the value of water and the demands of water users.*
- *Greater flexibility in the way water is allocated: in recognition of the significant uncertainty associated with changes in climate, economies and demographics, and the need for water allocation systems to respond to these changes.*

This approach involves the following steps, which essentially are the basic activities required for IWRM:

Step 1. Situation assessment

- Water resource availability
- Environmental flow assessment
- Water use (and efficiency) and demand (future)
- Principles for sharing

Step 2. Scenario development

- Identify different supply and allocation options
- Modeling to develop scenario water balance
- Assess and consider variability/uncertainty

Step 3: Assess implications of different scenarios (Sustainability dimensions)

- Environmental
- Economic (development)
- Social (equity)

Step 4: Decision and approval (decision on preferred options)

Step 5: Final plans and implementation

- Infrastructure, development and operation plans
- Water allocation plans (national, basin, regional, sectoral plans)
- Water efficiency plans

On the other hand, efforts towards basin water allocation must be based on *adaptive management approaches* to account for major variabilities and uncertainties. Speed et al. (2013) state the following as the main uncertainties:

- *The first uncertainty relates to water availability, and the need ...to estimate future surface and groundwater availability at different times. This uncertainty is linked to climate and our lack of understanding of hydrological processes. (effects of climate change)*
- *The second uncertainty relates to our inability to predict future water demands and uses.*
- *The third uncertainty relates to the risk that our institutions may not be addressing the real issues, or might take decisions that they later come to regret. This can occur if decisions are based on unreliable data or on models that represent reality in biased ways.*

These uncertainties require risk-based and informed decision making, as emphasized in Agenda 21.

5 Sustainable Development Goals (SDGs)

It is mentioned in earlier sections (Sections 3.3 and 4.1) that Rio + 20 in 2012 (UN 2012) was the major summit to foresee the closure of MDGs and the introduction of SDGs into water policies by 2015, to finally converge with the **Post-2015 Development Agenda**. Since then, The UN System, particularly UN-Water, and other relevant organizations have spent intense efforts to formulate the SDGs, and in September 2015, the Agenda was accepted for Sustainable Development at the Summit held in UN Headquarters in New York, which marked the high-level opening of the 7th session of the UN General Assembly. The set of goals shown in Fig. 3 particularly foresee to put an

| | | | |
|---|---|---|--|
|  <p>1 NO POVERTY</p> <p>End poverty in all its forms everywhere</p> |  <p>6 CLEAN WATER AND SANITATION</p> <p>Ensure availability and sustainable management of water and sanitation for all</p> |  <p>11 SUSTAINABLE CITIES AND COMMUNITIES</p> <p>Make cities and human settlements inclusive, safe, resilient and sustainable</p> |  <p>16 PEACE, JUSTICE AND STRONG INSTITUTIONS</p> |
|  <p>2 ZERO HUNGER</p> <p>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</p> |  <p>7 AFFORDABLE AND CLEAN ENERGY</p> <p>Ensure access to affordable, reliable, sustainable and modern energy for all</p> |  <p>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</p> <p>Ensure sustainable consumption and production patterns</p> | <p>Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</p> |
|  <p>3 GOOD HEALTH AND WELL-BEING</p> <p>Ensure healthy lives and promote well-being for all at all ages</p> |  <p>8 DECENT WORK AND ECONOMIC GROWTH</p> <p>Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</p> |  <p>13 CLIMATE ACTION</p> <p>Take urgent action to combat climate change and its impacts</p> | |
|  <p>4 QUALITY EDUCATION</p> <p>Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</p> |  <p>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</p> <p>Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p> |  <p>14 LIFE BELOW WATER</p> <p>Conserve and sustainably use the oceans, seas and marine resources for sustainable development</p> |  <p>17 PARTNERSHIPS FOR THE GOALS</p> |
|  <p>5 GENDER EQUALITY</p> <p>Achieve gender equality and empower all women and girls</p> |  <p>10 REDUCED INEQUALITIES</p> <p>Reduce inequality within and among countries</p> |  <p>15 LIFE ON LAND</p> <p>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</p> | <p>Strengthen the means of implementation and revitalize the global partnership for sustainable development</p> |

Fig. 3 Sustainable development goals (<http://www.unwater.org/sdgs/en/>)

end to poverty, to protect the planet, and to ensure prosperity for all within the next 15 years. The goal that directly relates to water is *Sustainable Development Goal (SDG) 6, 'Ensure availability and sustainable management of water and sanitation for all'*, which includes targets and indicators that will be used to measure and track global progress on water and sanitation through to the 2030 deadline (UN-Water 2015; <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>; <http://www.unwater.org/sdgs/en/>).

At present, efforts in the water community are focused on SDG 6 to investigate how water management plans can be revised or improved to meet the Goal. A synthesis report is prepared by WWAP under the working title “SDG 6 Synthesis Report: Water and Sanitation in the 2030 Agenda” (<http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/sdg-6-synthesis-report/>). This report “*will provide the global status of SDG 6 and explore the linkages within SDG 6 targets and the interlinkages between SDG 6 and the other SDG targets and indicators. The report will provide Member States with the 'big picture' on water and sanitation issues as well as policy recommendations on how to accelerate the achievement of SDG 6 within the broader context of Agenda 2030*”.

The first version of this report will be available to UN Member States in 2018. The preparation of the synthesis report is undertaken by the UN-Water Taskforce (coordinated by WWAP) that includes CEO Water Mandate, FAO, ILO, UNECE, UNDP, UNEP, UNICEF, UN-Water Technical Advisory Unit (TAU), WHO and WMO.

Some inputs to the above report were formulated at the recent Budapest 2016 Water Summit (<http://www.budapestwatersummit.hu/budapest-water-summit/news/>) where the *targets of the Clean Water and Sanitation (Sustainable Development Goal 6)* are disclosed as (<http://www.budapestwatersummit.hu/budapest-water-summit/overview/overview-of-sustainable-development-goals-542/>):

- 6.1 *by 2030, achieve universal and equitable access to safe and affordable drinking water for all;*
- 6.2 *by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations;*
- 6.3 *by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse by x% globally;*
- 6.4 *by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity;*
- 6.5 *by 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate;*
- 6.6 *by 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes;*
 - 6.a *by 2030, expand international cooperation and capacity-building support to developing countries in water and sanitation related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies;*
 - 6.b *support and strengthen the participation of local communities for improving water and sanitation management.*

6 Concluding Remarks

The overview presented in this paper on water policy development within the last 30 years starts essentially with Agenda 21 as the first international document to introduce the basic concepts of sustainability and integrated (holistic) water resources management (IWRM). The following international summits (i.e., Rio + 10, Rio + 20, Millenium Summit of 2000, World Water Forums, and the similar) had the purpose of evaluating whether the goals of Agenda 21 had been met or not. The results of these evaluations showed the misimplementation of basic guidelines and that problems still remain regarding sustainability and environmental (and hence water) management. It is clear that we still experience water crisis basically due to mismanagement of the resource. In a recent discussion of SDGs, it is stated that *“Today it is widely recognized that an integrated approach to freshwater management offers the best means of reconciling competing demands with supply and a framework where effective operational actions can be taken. It is thus valuable for all countries at all stages of development”* (<https://sustainabledevelopment.un.org/index.php?menu=220>).

It is believed that the solution to major water problems is IWRM and that all nations should adopt IWRM as a solution to achieve water security and must first take the necessary steps to establish the required institutional and legal adjustments for IWRM. Development of sound management policy statements is another requirement. Furthermore, coordination between institutions must be ensured so that they commit themselves to share the necessary funding for IWRM. Regarding the SDGs, for the goals to be reached, everyone needs to contribute: governments, the private sector, civil society and every individual.

Developed countries have already developed or are developing the required basis for implementation of IWRM. Yet, developing countries like Turkey still have a long way to go before they can attempt the requirements of SDGs. Summarized below are some of the important problems that Turkey experiences towards sustainable water management (Svendsen et al. 2005; Harmancioglu 2008):

- *Lack of integrated planning:* IWRM has been a concept recognized about 10 years ago. The first efforts to IWRM started with the preparation of “basin protection action plans” which provide only an inventory of the status of a few basins in the country. There is yet no basin for which an IWRM plan is established.
- *Developing local solutions to local problems*
- *Lack of a national Water Law:* This has been a problem addressed for long years but there is no result yet. The authorities focus on European Water Framework Directive since, as being a candidate country for accession to EU, Turkey tries to adapt to EU rules. Yet, there still is no case where principles of the EU Framework Directive are completely applied.
- *Lack of a national database on environmental processes, lack of sound monitoring practices and information*
- *Lack of a concern over sustainability*
- *Authorities using global warming as an excuse for water problems*
- *Lack of coordination among relevant institutions*
- *Lack of evaluation of risks in water planning*
- *Slow response to fast growing problems*
- *Lack of capacity building and knowledge*

- *The need for a unified coordinating mechanism for allocating water among irrigation, urban demand, industrial requirements and environmental protection to replace existing bilateral processes.*

In addition to the current problems affecting water management and basin governance, there are longer-term problems which will require more fundamental changes in laws, policies, institutions, and practices. One of the most significant is the *rudimentary Water Rights System*. The current national system of recording and harmonizing rights to use water dates back to earlier years and is not well adapted to a water short environment. It does not provide security for present users, does not allow for or adequately protect environmental uses of water, and does not provide incentives for economy of use or for orderly transfers among sectors (Svendsen et al. 2005).

Before concluding with the above overview, we must emphasize the timely role and significant contribution of the *Water Resources Management Journal of EWRA* that has witnessed the developments in water policies within the last 30 years. *Water Resources Management* is supported scientifically by the European Water Resources Association (EWRA). The journal supports research and application of scientific knowledge among both researchers and practitioners by addressing not only the European but also the international audience in terms of water resources management. It covers versatile aspects water resources, ranging from water resources assessment, development, conservation and control, water policies, planning and design of water resources systems to their operation and maintenance. For example, on the issue of sustainability stressed in this paper, one may find a wide range of articles dating back to 1991 (Mergos 1991) and the most recent ones in 2017 (Halkijevich et al. 2017). As for water security, one may find articles dating back to late 90s (Livingstone 1995) or to the most recent years (Grafton 2017). It is expected that the journal will continue to promote research on the most recent concepts and issues in water resources management and preserve its international character with higher impact factors.

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