

Chapter 17

Challenges for the Future



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Abstract This chapter is basically a wrap-up of current problems regarding water resources and management in Turkey and discusses challenges for the future in the light of these problems. The most challenging issue appears to be water scarcity resulting from fast increases in population, urbanization, industrialization, agriculture, expansion of tourism, and increases in economic activities, climate change, and resource depletion. The chapter also discloses how authorities and water communities in the country react to these challenges and plan new targets for the future.

Keywords Water crisis · Water scarcity · Global Risks Reports · Climate change · Food security · Water allocation · Sustainability · Integrated Water Resources Management (IWRM) · Water security · Data · Future challenges

The preceding chapters of this book have discussed the current status of water resources and their development in Turkey, focusing also on associated problems and measures taken to resolve them. This chapter serves basically to refresh the list of major difficulties which still prevail and constitute challenges for future developments.

Turkey has taken significant strides since the foundation of the Republic in 1923 towards establishing a multifaceted framework for structural, institutional and legal aspects of water resources developments. Especially after the establishment of General Directorate of State Hydraulics Works (DSI) in 1954, Turkey has built many water resources systems and structures in Turkish river basins for purposes of

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irrigation, domestic water supply, power generation, flood control, and other purposes. In particular, the last 3–4 decades have witnessed large scale and unique development plans and systems, including water transfer among basins and even transport to neighboring water scarce regions. In recent years, Turkey has hosted 3.5 million migrants from Syria, Iraq and Afganistan. Approximately 10% of the migrants live in special camps, and their water, sanitation and other basic needs are met by the Government of Turkey. Again Turkey is undertaking infrastructure activities in selected African countries to provide basic water needs and flood control.

On the other hand, new problems have emerged since the early 80s as Turkey gradually became exposed to global crises that also struck the majority of the countries in the world. The international community was fast to react to this situation and developed guidelines for environmental management, development of water resources and sustainability. Turkey followed these developments at a rather slower pace but was able catch up with the required procedures towards assessing and handling her problems. However, some overarching difficulties are still valid for most countries and for Turkey.

Water still continues to be of paramount importance in the world as it is linked to many sectors, i.e. environmental, socioeconomic, energy, food production, and the similar. World Economic Forum's Global Risks Reports have listed water crises as a one of the top-five risks in the world for the third consecutive year (World Economic Forum 2016, 2017, 2018). Turkey also experiences this crisis and is currently a country under water stress. In that regard, the most challenging issue appears to be water scarcity resulting from fast increases in population, increased competition for water, urbanization, industrialization, agriculture, expansion of tourism, increases in economic activities, climate change, and resource depletion.

Another major risk specified in the above Global Risks Reports is climate change. It already started to impact Turkey through changes in precipitation patterns, droughts and floods. Changes in the frequency and intensity of these events are being observed, and, as Chap. 14 of this book indicates, a significant decrease in precipitation for almost all parts of the country is expected in the future. The intensity of drought conditions is expected to increase so that more intense arid conditions are expected in the region. Chapter 3 of this book discloses that there will be 16% and 27% reductions in the water potential of Turkey by 2050 and 2075, respectively. While the existence of a large number of dams and small dams in Turkey helps adaptation to climate change, it also causes water losses due to evaporation from reservoir surfaces. However, there are limits to their effectiveness of water storage for adapting to future hydrological extremes in the water cycle. In that regard, the existing multiple water storage infrastructures in river basins must be managed in an optimal way with a systems approach considering water availability forecasts and demand projections. Another requirement is the evaluation of risks in water resources planning and the adoption of risk based design procedures particularly to mitigate climate induced risks.

Water scarcity coupled with climate change impacts leads to an increase in water demand, which is also due to increased agricultural use, growing population and

cities, and rapid industrial development in Turkey. As Turkey's population heads to 95 million people by 2050, water demands for food, cities and industry are expected to increase significantly. Water management in the near future must consider links between the water scarcity, climate change, and food security.

In that regard, water allocation has become an important issue that deserves further attention and investigations since loosely-planned and controlled allocation among water users leads to conflicts. The fast population growth, increased competition for water, increasing (and newly emerging) demands, and hence, water scarcity all necessitate equitable allocation of the resources so that Turkey has to focus on developing allocation plans in all her basins. A unified coordinating mechanism must be attained for allocating water among irrigation, urban demand, industrial requirements and environmental protection.

The concept of IWRM (Integrated Water Resources Management) constitutes a basis for the solution of the above mentioned problems. It provides useful tools for climate change adaptation and mitigation for water management such as infrastructure, land use management, agriculture, water quality management, floods and droughts management and governance. Turkey has to elaborate the already started efforts to first solve the difficulties encountered in management. Among these is the recognition and full understanding of the need for sustainable development where water plays a central role. With regard to water scarcity, there also exists the need for efficient water use in agriculture as it is the most water consuming sector in Turkey. On the other hand, there is the recognition in Turkey that there are multiple dimensions to water resource management problems, i.e. different disciplines, different interests, different uses, ground and surface water, quantity and quality, and so on. This recognition provides opportunity to develop an integrated approach to basin water resource planning and management.

One of the requirements of IWRM is the availability of sound and reliable data upon which management decisions are made. Data provision is an important issue in Turkey since basin management and other water related activities are often hindered by data limitations. There is the need for accurate and up-to-date descriptive information and a national database on all aspects of water resources in basins, including water allocations, reservoir positions, groundwater elevations and quality, water quality conditions, available resources, etc. Furthermore, this information should be accessible to users, possibly at minimal costs depending on the type of data. In particular, groundwater quality monitoring is not widespread and the results are not publicly available, making it difficult to know if significant degradation of groundwater quality is occurring. To solve the data problems, the hydrometric network should be improved and reassessed at particular intervals in time. Furthermore, the concept of data management should also be recognized as a significant activity for provision of data (Harmancioglu et al. 1998).

As discussed in some of the preceding chapters of this book, a new national Water Law is definitely required to support decision making for water management. Studies on this issue started in the late 90s, and a draft law was finally achieved in 2010. However, the law still remains in its draft form and requires immediate

attention of the authorities to lay legal groundwork for effective basin management and protection.

Turkey has developed links with various international institutions in the water sector, which provide access to international experience on basin governance problems. Furthermore, the country has the willingness to communicate and cooperate with these institutions. Along this line, there is a strong motive at the authoritative level in harmonizing standards, practices, and procedures with those of the EU. Adopting the EU WFD (Water Framework Directive) has provided significant benefits in Turkey's efforts towards preparation of basin management plans.

The above issues were discussed in-depth at the 2nd Council of Forestry and Water, which convened in 2017 with the participation of a wide audience, including public authorities, managers, universities, NGOs, and representatives of the private sector. The purpose of the Convention was to develop national policies and strategies towards sustainable management of water and forest resources and to delineate all pathways (structural, legal, resource management, application, monitoring and evaluation) that are needed to solve prevailing problems in the forestry and water sectors. For the water area, 51 concluding decisions were formulated in the form of Actions Plans to be put into practice (ORMANSU 2017). These decisions are actually targets which Turkey envisages as the required steps towards coping with future challenges in the foreseeable future. Among these, the following are worth noting as they address the major current and expected problems in water management:

- Preparation of a National Water Plan and a Water Security Plan to provide decision support tools for water authorities and managers; efforts towards this target are initiated in 2017 to be completed by 2023, the centennial of the foundation of the Turkish Republic;
- Completion of the National Water Information System and provision of its progressive continuity and service effectiveness to be effective as of 2018 and continue onward;
- Encouragement of activities which lead to more effective and efficient uses of water through: reduction of evaporation from reservoir surfaces; selection of crops that can resist drought conditions; reduction of losses in drinking water distribution systems; use of gray water; harnessing of rainwaters; use of water saving armatures; development of smart distribution systems for drinking water and irrigation waters; the application of the “Polluter pays” principle to manage save water; selection of industrial processes that reduce water consumption and do not cause pollution; encouragement of water saving means through education and dissemination of information (to arouse awareness in public); determination of water footprints and thus supporting water saving approaches;
- Provision of the reuse of irrigation return flows and treated wastewaters in irrigation;
- Continuation of water pollution prevention actions so as to support the application of more effective basin management plans; protection of drinking water basins; development of a more efficient management procedure based on a “basin-wide” approach;

- Preparation of a legal basis which will permit the management of water resources and irrigations by a single central authority;
- Improvement of the institutional capacities and performances of irrigation Water User Associations (several detailed proposals were considered to handle this issue);
- Develop the legal and institutional basis for flood insurance systems so as to reduce flood risks;
- Assessment of legislation on floods and precise specification of relevant authorities and responsibilities to better manage flood mitigation activities;
- Delineation of responsibilities, authorities and sanctions on a legal basis, regarding dam safety and security (an important issue for the aging dams in Turkey);
- Development of a National Drought Database; preparation of emergency action plans for drought periods; consideration of droughts within the framework of “disasters”;
- Completion of hydrogeological investigations and surveys all over the country; determination of groundwater masses and their quality; implementation of measures to prevent groundwater pollution.

This chapter starts with the claim that *“Turkey has taken significant strides since the foundation of the Republic in 1923 towards establishing a multifaceted framework for structural, institutional and legal aspects of water resources developments”*. This is not an exaggeration but a realistic summary of what Turkey has accomplished within the last 95 years, which is actually a short span of time in comparison with the practices of developed countries. This book presents several examples of how the country managed to develop her water resources potential in this period. Just to give one example, the hydroelectric energy production of Turkey was only 1 TWh/y in 1960 but increased to about 75 TWh/y in 2017, which is equal to half of the economically feasible hydroelectric potential of the country. The total installed capacity of hydroelectric power plants was 0.4 GW in 1960 and increased to 27.3 GW in 2017, thus nearly 70 times in 57 years. Certainly, establishing a multifaceted framework for water resources developments within such a short period of time implies that the problems encountered have also been multifaceted, particularly due to data limitations, institutional and legal inefficiencies in the beginning. However, early recognition of these problems has finally created the current status of Turkey with respect to water resources development, where the country not only handles her own problems but also provides support to neighbouring water scarce countries and to selected needy countries in Africa.

As of today, the global water crisis has inevitably struck Turkey as it adversely affects many parts of the world. The major factor leading to this crisis is water scarcity aggravated by impacts of climate change. Water scarcity has embittered a chain of threats to many related sectors such as environmental security, water security, food security, energy, agriculture, and socioeconomics, to name a few. Turkey has also recognized these and other emerging problems regarding sustainable water management and developed a fast response to the crises. As summarized

in the above targets, which were defined at the 2017 Second Council on Forestry and Water, Turkey is firmly determined and committed to resolve these issues in concrete steps within the deadlines specified for each target.

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