Please cite the work as follows:
Cetin, M., 2020. *Agricultural Water Use.* In N. B. Harmancioglu, D. Altinbilek (eds.), ***Water Resources of Turkey, Chapter 9,*** World Water Resources 2, https://doi.org/10.1007/978-3-030-11729-0_9, Springer Nature Switzerland AG 2020, ISBN 978-3-030-11728-3, *pp. 257-302*. {For details: https://www.springer.com/gp/book/9783030117283}

Chapter 9
Agricultural Water Use



Mahmut Cetin

Abstract Turkey is located in a semi-arid region. Due to topography, geological conditions, sea effect and the geographical position of the country, distribution of precipitation has shown temporal and spatial variability. Consequently, soil and water resources in the 25 river basins are not distributed evenly over the country. Therefore, irrigation is a prerequisite in order to develop a highly productive agricultural system, as well as to optimize agricultural production. Turkey has a total of 25.85 million hectares (Mha) irrigable area, of which 22.6 Mha land can be envisaged as economically and technically irrigable under today's conditions. Based on the soil, topography and drainage conditions, the national governmental agency -State Hydraulic Works (DSI)- responsible for development of soil and water resources including irrigation in Turkey set a goal nearly 60 years ago that 8.50 Mha area had been economically and technically irrigable under the available technology. Of the targeted irrigable area, as of 2017, 6.57 Mha land was equipped with irrigation facilities, 65% of which was constructed by DSI. Four major irrigation organizations were emanated for operation and maintenance services of irrigation schemes. As of the end of 2017, 4.28 Mha gross area (net 3.37 Mha) was equipped with irrigation facilities constructed by DSI; 73% of net irrigation area constructed by DSI was transferred to water user associations (WUAs). 15% was operated by irrigation cooperatives (ICs) and the remaining 12% by DSI. In order to increase the sizes of agricultural enterprises and decrease the average parcel numbers of undertakings, implementation of land consolidation (LC) projects in agricultural areas is necessary. Implementing LC projects before irrigation construction renders at least 40% savings in expropriation and construction costs. It also helps irrigation managers to increase the very low irrigation efficiencies (average 37%) and irrigation ratios (42% in DSI operated, 66% in WUAs operated irrigation schemes). As of the end of 2017, totally 54 BCM water was consumed in irrigation, domestic and industrial sectors. Of this, a total of 74% was consumed by irrigation such that 56% (30.2 BCM) was supplied from surface water resources and 18% (9.8 BCM) from

M. Cetin (✉)
Department of Agricultural Structures and Irrigation, Faculty of Agriculture, University of Cukurova, Adana, Turkey
e-mail: mcet64@cu.edu.tr

© Springer Nature Switzerland AG 2020

N. B. Harmancioglu, D. Altinbilek (eds.), *Water Resources of Turkey*, World Water Resources 2, https://doi.org/10.1007/978-3-030-11729-0_9

groundwater resources. Regional development projects regarding irrigation have an important role so as to eliminate in inter-regional differences in terms of development. In this regard, *The Southeastern Anatolia Project*, i.e. *the GAP*, is considered as one of the biggest integrated regional development projects in the world. The GAP is a brand name of Turkey and contributes widely to increase the agricultural production of Turkey. After the completion of the GAP components, 1.79 Mha area will have been equipped with irrigation facilities. Net agricultural income has increased about four-fold in the GAP irrigation areas. However, it was observed that gross domestic agricultural product increased about six-fold in the GAP areas due to the irrigation practices. Irrigation return flows need monitoring in order to take preventive measures on time.

Keywords Irrigation ratio · irrigation efficiency · land consolidation · Water User Associations (WUAs) · Southeastern Anatolia Project (GAP)

9.1 Introduction

Turkey is a Mediterranean country and a peninsula surrounded by the Mediterranean, Aegean, Marmara and Black Seas. Geographically, it is located between 26°–45° east longitudes and 36°–42° north latitudes (DSI 2016a). Thus, there is a 6° difference in latitudes. Topography varies from mean sea level of 0–5137 m, which is the highest elevation at the culmination of Mount Ararat. Mean altitude is 1132 m. Latitude differences, the distance from seas, extent and orientation of mountain chains, and topographical variations cause to emanate primarily four different climate types over the country, i.e. continental climate dominant in southeastern Anatolia, east Anatolia, central Anatolia and Thrace regions; Mediterranean climate, Thrace transition zone climate, and Black Sea climate. Except for the Black Sea region, semi-arid climate conditions prevail in Turkey. No arid zones have been experienced up to the present. However, research results by Selek et al. (2018) indicated clearly that there is an increase in semi-dry and dry humid zones (approximately 14%) and a decrease in the semi-dry-less humid to humid zones of Turkey. Each climate zone has its own characteristic ecological zones for agricultural production. For this reason, Turkey is known as the realm of ecologies. However, spatial and temporal variabilities in temperature and precipitation values hinder year-round production of field and horticultural crops under natural conditions. In this context, precipitation is the most limiting factor for consumptive use. Therefore, sunflower, cereals and pulses are the main field crops, which can be economically grown under rain-fed conditions over the country, except for the Black Sea region. On the other hand, olive and fig in the Mediterranean region and pistachio in the Eastern Anatolia region are horticultural crops grown under rain-fed conditions. Consequently, irrigation is necessary to ensure sustainability of agricultural production and food security in Turkey, except for the eastern Black Sea region.