Chapter 16
Improved Irrigation Management for Sustainable Agriculture

Vesna Popović
Institute of Agricultural Economics, Serbia

Vladan Ugrenović
Agricultural Extension Service Institute Tamiš, Serbia

ABSTRACT

Studying the future of food and farming, scientists have called for sustainable intensification to simultaneously raise yields and increase efficiency in the use of inputs and reduce the negative environmental effects of food production. Sustainable intensification requires sustainable agricultural techniques such as improved water management practices that result in higher, stabilized, and diversified agricultural production, and greater resilience to climate change without the deterioration of natural resources and the environment. This chapter is devoted to the role of irrigation development in Serbian agriculture and its contribution to the development of the green economy in the Republic of Serbia.

INTRODUCTION

To feed the increasing global population, food production will have to double within the next 40 years, and the achievement of this objective depends largely on the availability of water and on irrigation systems. Irrigation is of particular importance for small-scale farmers that provide the majority of the global food supply. Small-scale farmers often occupy marginal land and depend mainly on rainfall for production. This makes them highly sensitive to climate variability. Without reliable access to water and the means to manage water effectively, small farmers are unable to turn agriculture from a subsistence activity into an income-generating business (UN, 2011a).

On the other side, according to OECD data, a 55% increase in global water use is projected between 2000 and 2050. By 2050, nearly half of the world population will live in severe water stressed areas. This is in addition to water quality deterioration and the occurrence of more frequent and severe droughts as the results of climate change (UN, 2011b).

DOI: 10.4018/978-1-4666-7521-6.ch016

Improved irrigation methods, technologies and management models play an important role in boosting water use efficiency and water productivity. This requires the agreement of stakeholders at all levels on institutional and management reforms, and substantial investment in irrigation technologies and infrastructure.

Agriculture is among the key sectors of the economy of the Republic of Serbia, with the share of 10.3% in total GVA (15.8% together with the food industry). Food and agriculture take share of 24.1% in total export (Statistical Office of the Republic of Serbia [SORS], 2013a).

More than 1.4 million people live and work on family farms and about 26 thousand people work on the farms of legal entities and entrepreneurs (20% of total population). Nearly half of 621,445 agricultural holdings with land are smallholder family farms, with less than two hectares of utilized agricultural area, while another 29% of farms operates on land size between two and five hectares (SORS, 2013b).

However, production and market capacities of the agricultural sector are much higher. Serbia has 5.05 million ha of utilized agricultural land (agricultural holdings' areas - enterprises, farm cooperatives and family holdings, and those other than of agricultural holdings - communal trodden land, pastures and other lands) of which 4.21 million ha or 83.4% is cultivable: 3.282 ha (65.0%) are arable land and gardens, 292 ha (5.7%) orchards and vineyards and 641 ha (12.7%) are meadows (SORS, 2013a). FTAs with EU, Russia and CEFTA countries have created significant export opportunities for Serbian agriculture.

Trend analysis of annual air temperature for the period 1951 - 2012 indicates that rise in temperature is present on the whole territory of Serbia and it is the most intense in the lowland agricultural regions in the north of Vojvodina province, in the wider vicinity of Belgrade and on the east, in the fertile Negotin plain. Summer 2012th was twenty-third consecutive warmer summer than average (Serbian Environment Protection Agency, 2013).

Uneven and insufficient precipitations threaten the achievement of high and stable agricultural yields. Precipitation deficit accompanied by high temperatures and heat waves have resulted in an increase in the frequency and intensity of drought. Revenue losses arising from decrease in yields in the agricultural sector due to drought registered in Serbia after 2000 years, ranging between 0.7 billion dollars (drought in 2000) and 2.1 billion dollars (drought in 2012) (Gulan, 2012).

IPCC climate change projections indicate a further increase in air temperature and decrease in precipitation in the region of Southern Europe, including Republic of Serbia (Republic Hydrometeorological Service of Serbia, 2007).

Irrigation systems upgrading and construction is one of the key mechanisms of adaptation in agriculture and as such it must find proper place in the National Adaptation Plan and the relevant sector strategies, and access to adaptation funds (Tyagi, 2014; WWF-EIC, 2012).

In the context of adaptation to climate change irrigation is used as a tool to compensate the deficit of moisture in the soil as well as to optimize the benefits of the expected extension of growing seasons and mitigation spring and autumn frosts.

Studies have shown that in the local climatic conditions and with the application of appropriate agricultural inputs and techniques, irrigation can increase yields by 50 to 80%, and in the years with a severe drought for 2 to 4 times in some crop species (Dragović, 2001; Maksimović & Dragović, 2004; Obradović, Teofanović, P. Petrović, M. Petrović, & Ružičić, 2012).

According to 2013 statistics, which monitors irrigation on agricultural land of business entities and cooperatives, 85,593 ha were covered by irrigation systems of which irrigated area was 53,086 ha (62%). The share of irrigated land in utilized agricultural area was 1%. Total water abstracted for irrigation was 88,130 thous. m^3. Most was pumped from rivers (91%) while the rest was abstracted from the groundwater, lakes, reservoirs and public water supply network (SORS, 2014).