

## **Sustainable Consumption of Water In Agriculture – Special Reference With Overseas Unswerving Venture And The Human Rights**

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### **Abstract**

*Sustainable water management (SWM) is a critical component of sustainable development, and accounts for similar issues as sustainability. SWM as meeting current water demand for all water users without impairing future supply. Sustainability of water use in agriculture is a line of research that has gained in importance worldwide. This paper reviewed 25 years of international research on sustainable water use in agriculture. A bibliometric analysis was developed to sample 2084 articles. Results indicate exponential growth in the number of articles published per year, with research in this field having acquired a global scale. Environmental Science and Agricultural and Biological Sciences are the main categories. Three journals—Agricultural Water Management, Water Resources Management and Nongye Gongcheng Xuebao Agricultural Engineering—published the most of the articles. China, the U.S., Australia, India and Germany produced the most research. The three institutions that published the most articles were all Chinese (Chinese Academy of Sciences, China Agricultural University and Northwest A&F University). The most cited authors were Ridoutt, Hoekstra and Zhang. The keywords most frequently used include: water-use, irrigation, water-management, water-supply, and sustainability. A network map shows three clusters that focus on the environmental, agronomic and management aspects. The findings of this study can assist researchers in this field by providing an overview of research on the sustainability of hydric resources. The water privatization processes undertaken in different countries is detailed, with the aim of identifying the extent to which the ‘business of water privatization’ represents sound policy in the face of this world water crisis and the demand for sustainable water consumption. This discussion supports a broader claim: that of the human right to access water. Private sector involvement is necessary in some countries and regions of the world to promote ‘water social inclusion’ given the lack of public resources for investment. However, the success of such policy, in most places, depends on previous public regulation that considers sustainable development and human rights.*

**Keywords:** Sustainable water consumption, Human right to water, Water privatization Business and human rights

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Agricultural water use accounts for 70% of global water consumption, and can exceed 90% in developing nations. Water management of natural systems is a key requirement of sustainable urban and agricultural management practices. Sustainable water management (SWM) is a critical component of sustainable development, and accounts for similar issues as sustainability. SWM as meeting current water demand for all water users without impairing future supply. Agriculture Water Management - for Improving Crop Productivity. ... It also helps in the understanding of plant water use, quantifying crop transpiration and soil evaporation and allows us to devise strategies to improve crop production, reduce unproductive water losses and prevent land and water degradation.

Today the world confronts a dilemma in addressing the cross-cutting issues of fresh water scarcity and the crisis of supply, increasing contamination of water sources, suboptimal water management and the eagerness of the private sector to capture the water market, which has now become ‘big business’. This present chapter thus draws a picture of the entry of the private sector into the water business through foreign direct investment against the backdrop of the worldwide demand for sustainable water consumption and the human right to water.

The chapter begins with a region-by-region inventory of the global water crisis to show the full extent of ‘peak water’. Next, an overview of private investments in water services is provided, assessing degree to which the ‘business of water privatization’ represents sound policy against the backdrop of a worldwide water crisis and the need to ensure sustainable water consumption. To this end, the privatization processes undertaken

in different countries, including France, the United Kingdom, Argentina, Bolivia, Uruguay, Chile and Brazil, will be analysed. Opponents of some of the more suboptimal water privatizations undertaken worldwide have raised a distinct claim: the human right to water. This study will detail the evolution and consolidation of this basic rights claim from its first documentation in the United Nations General Comment No. 15 (2002) through to the most recent publication of the General Assembly (2010), the reports of the UN Special Rapporteur (2013) and the 2015 Sustainable Development Goals (SDGs). Finally, the content of the human right to water will be scrutinized to show how it might be raised in international and domestic fora to promote and support SDG 6, which covers access to water and sustainable water consumption.

### **I. Prominence of Water Sustainability**

At this pace, available freshwater reserves needed to ensure basic water, food, and energy security are predicted to drop by 40%. As the world warms, climate change can threaten ecosystems and environments that protect vital water resources, limiting access to them even more. Water is considered as the most critical resource for sustainable agricultural development worldwide. Irrigated areas will increase in forthcoming years, while fresh water supplies will be diverted from agriculture to meet the increasing demand of domestic use and industry. Furthermore, the efficiency of irrigation is very low, since less than 65% of the applied water is actually used by the crops. The sustainable use of irrigation water is a priority for agriculture in arid areas. So, under scarcity conditions and climate change considerable effort has been devoted over time to introduce policies aiming to increase water efficiency based on the assertion that more can be achieved with less water through better management. Better management usually refers to improvement of water allocation and/or irrigation water efficiency. The former is closely related to adequate pricing, while the latter depends on the type of irrigation technology, environmental conditions and the scheduling of water application. Agricultural practices, such as soil management, irrigation and fertilizer application and disease and pest control are related with the sustainable water management in agriculture and protection of the environment. Socio-economic pressures and climate change impose restrictions to water allocated to agriculture. The adoption of sustainable water management in Mediterranean is not only a technological problem but involves many other considerations relative to social behaviour of rural communities, the economic constraints, or the legal and institutional framework that may favour the adoption of some measures and not others. Sustainable water management in agriculture, which has a multi-functional role in Southern Europe, can be achieved by adopting improvements in irrigation application, soil and plant practices, water pricing, reuse of treated wastewater, farmers' participation in water management and capacity building.

Water is one of the most precious resources we have on this earth and it is under increasing stress. All of us have a responsibility to provide leadership in preserving it for future generations. The EU has a particular role to play in this regard and takes its responsibility very seriously. Water use in agriculture is at the core of any discussion of water and food security. Agriculture accounts for, on average, 70 percent of all water withdrawals globally, and an even higher share of "consumptive water use" due to the evapotranspiration requirements of crops. Worldwide, over 330 million hectares are equipped for irrigation. Irrigated agriculture represents 20 percent of the total cultivated land, but contributes 40 percent of the total food produced worldwide.

Water and hydrogel in agriculture will continue to play a critical role in water holding. The population is expected to increase to over 10 billion by 2050, and whether urban or rural, this population will need food and fibre for its basic needs. Combined with the increased consumption of calories and more complex foods, which accompanies income growth in much of the developing world, it is estimated that agricultural production will need to expand 70% by 2050. If this expansion is not to come at the expense of massive land conversions and the consequent impact on carbon emissions, agriculture will have to intensify. Given that irrigated agriculture is, on average, at least twice as productive per unit of land, provides an important buffer against increasing climate variability, and allows for more secure crop diversification, it is certain that irrigation will continue to play a key role in ensuring global food and nutrition security.

Agricultural water is water that is used to grow fresh produce and sustain livestock. The use of agricultural water makes it possible to grow fruits and vegetables and raise livestock, which is a main part of our diet. ... A decrease in applied water can cause production and yield to decrease. The agricultural water management practices are classified under surface, sprinkler, micro-irrigation (Drip) and subsurface irrigation. Foreign Direct Investment and the Human Right to Water

### **II. The Global Water Crisis**

After raising many environmental concerns related to water, the United Nations World Water Development Report, makes it clear that growing water consumption in the most industrialized countries (those with high per capita incomes), combined with demographic concerns (such as increasing urbanization and population growth in general), is the core of the global water crisis. The key issues, then, combine questions of

economics and sustainability, wherein ensuring sustainable sources of water for household and industry against a backdrop of rising incomes and a growing world population is thrown into sharp relief. The International Water Management Institute presented a report on water resource management for the years 2010–2012, highlighting global water scarcity, which affects one-third of the world population. The report identifies two kinds of scarcity: economic (where a lack of investment and infrastructure in the water sector limits effective supply) and physical (where the limited quantum of water is itself the key issue). Hundreds of millions of people around the world are affected by water scarcity. Studies show declining volumes of water in many reservoirs around the world, which according to scholars, has raised the risk of international disputes (possibly even leading to war) in water scarce regions. Some have pictured worrying panoramas for the water supply crisis in the world. We can detail this crisis on a regional basis.

The Middle East has lacked sufficient water for human consumption since 1970. It is the first region in the world to fall subject to chronic water scarcity, which means that there is not enough water to satisfy basic needs of its population and industry. Some have pointed out that the region ran out of water and that such information was not widespread because of lack of political interest as political costs of such an information would have serious consequences. In many parts of Africa, the situation is no different, but is particularly bad in Libya, Egypt, Sudan, Kenya and South Africa. As part of a Libyan water supply project, an 1860 km aqueduct has been built to transport fresh water from the Kufra basin into the Saharan desert region. Fresh water has also been at the top of the agenda of the Chinese government. In a biennial report published by the Pacific Institute, China's limited water supply was raised as an issue of serious concern. The situation in China has become worse with climate change. Having the highest population in the world (around a billion inhabitants), only 6% of the water in China is freshwater. More than half of the population has had to deal with water scarcity and shortages. India has exploited its underground water potential currently to exhaustion and a large part of rivers and lakes have dried up.

The crisis is not limited to developing countries either. Australia's so-called 'Millennium drought' lasted from 1996–2010, threatening agriculture in the Murray-Darling river region, known as the country's 'food bowl' for its high concentration of farming industries. Australia is already known for long periods of water scarcity. In California, USA, the last decades have witnessed the worst drought in history, and the effects of such climatic changes have been felt not just in the large urban centres but in agriculture as well. Water for irrigation has been brought in from Canada, leading a former Californian Governor to publicly declare that 'water is [now] more precious than gold'. In Latin America, concerns about water issues are also very serious. In the Mexican border cities, published reports suggest that the population, in certain regions, consumes Pepsi-Co and Coca-Cola instead of water because of scarcity and the higher prices of bottled water. In Lima, Peru, the poorest pay around US\$3 for each cubic metre of water and must fetch it in buckets. Brazil has one of the largest freshwater reservoirs in the world—estimates range from 12 to 20% of the planet's entire freshwater reserves. Nevertheless, despite all this potential, Brazil is not immune to water supply crises, as access to water across the country's vast territory varies significantly. According to research published by Tucci and colleagues, 68% of all Brazilian freshwater is located in the north of the country, where just 7% of the population live; the northeast, in contrast, has 29% of the population, but only 3% of freshwater reservoirs. The southeast, meanwhile, has just 6% of Brazilian freshwater for 43% of the country's residents.

Desalination has been presented as a solution for this water crisis. However, generating water in this way is tremendously energy intensive (adding to fossil fuel use) and inefficient—each gallon of sea water processed produces just one-third of a gallon of potable water. The remainder is brine containing concentrated toxic residues. When this brine returns to the sea, it can produce environmental damage, contributing to the death of many marine species. It is, besides, very expensive technology and economically unfeasible in poorer countries. Desalination is thus a suboptimal way to source water for sustainable consumption, especially if there are alternatives. This global water crisis underpins what has come to be known as 'peak water', referencing the more well-known idea of 'peak oil'. While reservoirs are not running out of water, as such, what is suggested is that the planet's capacity to sustain all the water demand is reaching its limit, as water is a renewable resource. After use, water typically returns to the cycle (evaporation, condensation, soil absorption, underground formation or ground waters) in a continuous process. However, in many regions, water use has exceeded this rechargeable capacity and the world now witnesses intensifying competition for the so-called 'blue gold'. In 2003, the United Nations proclaimed the International Decade Water for Life (2005–2015), coordinated by UN Water. Definitive goals were established for water supply and basic sanitation: half of the world population should have full access to clean potable water by the year 2015. Despite good achievements registered by the UN in 2015, the right of access to water and basic sanitation together with the claim for sustainable water consumption is still a fight for many across the world. A report presented by the United Nations Special Rapporteur on the Human Right to Water (2013) was centred on sustainability of the accomplishment of the right of access to water and basic sanitation. The Rapporteur raised her concern about the fact that the 2008–2009 global financial crisis has exacerbated long-running shortfalls in investment in the water sector, not to mention raised tariffs for water as governments scramble to plug growing public deficits. She

concludes that better public policies to guarantee the right of access to water and sustainable water consumption on a global scale are required.

### **‘Big Water’: Private Investment in Water Services**

By the nineteenth century, water supply services and basic sanitation emerged as matters of core public concern in the United States and Europe. The first water supply systems were privately managed and consisted of supplying water for the upper classes. States took water supply services into public hands, mainly in Europe, when they realized that the provision of clean water was a matter of public health and economic development. At the beginning of the twentieth century, public management of water sources had already been adopted in most European countries and in the United States. The neoliberal ideology that has come to dominate, mainly in Europe and in the United States, since the 1970s, largely influenced the water sector in developing countries. Public sector inefficiency in providing a proper supply of fresh water and basic sanitation triggered suggestions that the private sector should become involved. By the end of the 1980s, in many countries, privatization of water services meant a solution for that financial issue because this was a more politically palatable option for plugging public finances than raising taxes. The idea of privatizing the water sector was ‘sold’ too many countries as a way of promoting sustainability in the sector. The International Monetary Fund (IMF) and the World Bank—as the leading sources of international loans and financing—were the major preachers of that neoliberal policy, supporting investments by private companies in the water sector in developing countries. These two institutions advocated a policy posture of minimum State intervention in the economy and the entry of private providers into those parts of the public sector deemed inefficient and/or uncompetitive. At the United Nations Conference on Water and Environment (1992) in Dublin, a Declaration on Water Principles was made. Among the many principles enshrined therein, was the contentious notion that water has an economic value (Principle n. 4), which has been interpreted by many as a door through which the private sector may enter the domain of water management. Whether the principle has this effect, it remains true that loan conditionality for developing countries has included a core demand that they commit to the privatization of state assets.

The term ‘privatization of the water sector’ captures a range of different management models adopted worldwide. Budds and MacGranaham define it as private commercial participation (making investments and assuming the follow-on risks) in the supply of water and basic sanitation services but not necessarily with a transfer of property to private hands.<sup>28</sup> Different contract types are in use in the water sector, which range from agreements to provide specific services (for a short period) to Build–Operate–Transfer (BOT) models and concession contracts. There are also joint ventures and cooperatives. In all the contract models implemented in Latin America, little competition was seen in the public procurement procedures. Many have defended privatization of water services based on the claim that the private sector is best suited to assure sustainable water consumption and broader access to water. However, as Budds and McGranham have remarked. A number of multinational water companies have asserted that low income populations do not represent an attractive market because they are too poor to be profitable and represent too great a financial risk.

Representatives of Veolia stated that profits depend on ‘sufficient and assured revenues from the users of the service’, which are unlikely to include poor groups. Biwater’s general manager, referring to Zimbabwe, also claimed that: ‘From a social point of view these kinds of projects are viable but, unfortunately, from a private sector point of view they are not’. Leaving such environmental and social concerns to the private sector might not be the right political decision either. A 2008 study collected data covering four decades of water services management from different parts of the world, concluding that efficiency in the water sector is not related to the public or private nature of that service or its management. This study also clarifies that whenever the private sector enters the business, it only remains if there is profit, which has not complemented the public interest or the goal of sustainability. Even in countries where water services were almost totally privatized, the State has had to regulate to assure environmental and consumer protection. As is well remarked by Rogers and Hall. There is a growing perception that the governance of water resources and water services functions more effectively with an open social structure which enables broader participation by civil society, private enterprises and the media, all networking to support and influence government. Moreover, examining the role of networks or distributed governance helps to overcome the sterile debate about private versus public water service delivery and the role of the community. There is no single model of effective water governance; indeed, to be effective governance systems must fit the social, economic and cultural particularities of each country. More than 90% of all water supply and sewage services in the world are provided by the public sector. This is likely to remain the case, although the public sector has been accused of inefficiency and of not having enough resources to make the needed investments. Transfer of property to the private sector might not be the right policy to be adopted in most places whenever the issue is sustainability, but allowing the entrance of the private sector into the water business when the public sector lacks sufficient revenue to make the necessary investments is sometimes the only option left. Proper regulation—established in advance—has been the key for assuring sustainability in the water sector.

The next sections of the chapter will detail select cases of water privatization across the planet in recent decades, to highlight the concerns and issues that arise in private sector involvement, particularly concerning sustainability.

### **III. Conclusion**

The human right to access water has evolved historically, having been developed at the global level, affirmed internationally and then implemented domestically. The crisis in the water sector worsened by an objective water supply crisis in different parts of the world has given rise to a claim for a human right to water. This, however, has not been guaranteed in most countries, sometimes because of inappropriate privatization policies undertaken in the water sector, sometimes because of marginalizing trade policies, and sometimes because of inefficient public management. Three distinct social movements have been at the forefront of the claim to a right to water: environmentalists, those advancing social justice and groups focusing on sustainable development. For the environmentalists, all water sources must be preserved for present and future generations. For the social rights movement, water must be accessible to all and minorities should not be excluded. For the sustainable development movement, balanced and equitable access to water of sufficient quantity and quality are the ground for an adequate standard of living and sustainable water consumption. To promote so-called 'water social inclusion', performance indicators for monitoring the implementation of the human right to water must treat 'access' in terms of 'affordability' as paramount. In this context, one of the most efficient mechanisms is progressive tariffs, based on the economic capacity of consumers. Nevertheless, every country must define its own 'poverty line' (and in many, such as in Brazil, the poverty line will vary from region to region), to guarantee the human right to water for all, as well as sustainable water consumption, either under public or private management of water supply services.

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