

Executive Summary

Overview

World-wide there is an enormous challenge to produce almost 50% more food up to 2030, and double production by 2050. This will probably have to be achieved with less water, mainly because of pressures from growing urbanisation, industrialisation and climate change. Consequently it will be important in future that farmers face the right signals to increase water use efficiency and improve water management, especially as agriculture is the major user of water, accounting for about 70% of the world's freshwater withdrawals and over 40% of OECD countries' total water withdrawals.

The scope of sustainable management of water resources in agriculture concerns the responsibility of water managers and users to ensure that water resources are allocated efficiently and equitably and used to achieve socially, environmentally and economically beneficial outcomes. It includes: irrigation to smooth water supply across the production seasons; water management in rain-fed agriculture; management of floods, droughts, and drainage; and conservation of ecosystems and associated cultural and recreational values.

Agricultural water resource management covers a wide range of agricultural systems and climatic conditions across OECD countries, drawing on varying water sources, including: surface water; groundwater; rainwater harvesting; recycled wastewater; and desalinated water. It also operates in a highly diverse set of political, cultural, legal and institutional contexts, encompassing a range of areas of public policy: agriculture, water, environment, energy, fiscal, economic, social and regional.

Future policies to address the sustainable management of water resources in agriculture will be greatly influenced by climate change and climate variability, including seasonality problems, such as changes in the timing of annual rainfall patterns or periods of snow pack melt. In some regions, projections suggest that crop yields could improve. For other localities, climate change will lead to increased stress on already scarce water resources, while some areas are expected to see the growing incidence and severity of flood and drought events, imposing greater economic costs on farming and the wider economy. Irrigated agriculture, which accounts for most water used by agriculture, will continue to play a key role in agricultural production growth.

Key policy messages

- *Recognise the complexity and diversity of managing water resources in agriculture*

Recognition of the complexity and diversity of water resource management in agriculture, is important from a policy perspective, as it means there is no one-size-fits-all policy solution to improving water resource management. Policies addressing water resource management need to be tailored and targeted to situations specific to both countries and regions within countries. This reflects the great variety across different water basins from the local to international levels in terms of the: heterogeneity of

water sources (*e.g.* surface, groundwater, recycled wastewater, desalinated water); linkages between water resource (quantity) and water pollution (quality) issues; allocation of water between consumptive uses (*e.g.* agriculture, domestic, industrial, power generation) and to meet environmental needs; and the management of the complex institutional and property right arrangements associated with water.

- ***Strengthen institutions and property rights for water management in agriculture***

A shift in water resource policies with a greater accent on demand rather than supply management, has brought reforms to the institutional and property right structures in many countries. But the progress and path of water policy reforms has been mixed across countries which indicates the need for further progress in reforming policies. There is frequently a plethora of institutions involved in managing, allocating and regulating water resources at different levels of government, and continuing rationalisation of institutional structures could improve transparency and accountability.

The institutional complexity is also reflected in most OECD by an intricate set of legal rules concerning water property rights, where water is often allocated in terms of quantities rather than prices. As pressures build-up to reallocate water between different users and to meet environmental demands there is a need for water property rights to become more flexible, where these rights exist, and for supporting institutions to be more robust to ensure an economically efficiency and environmentally effective allocation of water. But it also emphasises the need to explore innovative water market solutions as allocative mechanisms.

- ***Ensure charges for water supplied to agriculture at least reflect full supply costs***

OECD analysis indicates that charges for water supplied to farms have been increasing in most OECD countries. However, in many countries farmers are only covering the operation and maintenance part of the full water supply costs, with little recovery of the capital costs for water supply infrastructure. Where countries have raised water charges, the available evidence indicates that it has improved water use efficiency rather than reduced output. But water charges rarely reflect scarcity and social values or environmental costs and benefits (*i.e.* full cost recovery). These are usually addressed by other policy measures, including agri-environmental payments, pollution taxes and water allocation mechanisms. These measures, however, do not address the scarcity value of water, but some countries are using the principle of full cost recovery to guide their water policy frameworks. Trading of water entitlements can provide a scarcity market price and lead to the highest value use of water resources.

Policies regarding on-farm water resources, mainly groundwater, usually involve licenses and other regulatory instruments, but because of high transaction costs to enforce compliance, the degradation and illegal pumping of groundwater remains a challenge. To achieve sustainable groundwater use more effort will be required to enforce regulatory measures and develop mechanisms for volumetric management and charging, especially where water stress is a serious issue.

- ***Improve policy integration between agriculture, water, energy and environment policies***

In many instances OECD countries policies across agriculture, water, energy and environment are formulated without sufficient consideration of their interrelationship in any comprehensive manner or their unintended consequences. Agricultural policies linked to production and inputs (water and energy), for example, can encourage less efficient use of water and energy, lead to off-farm pollution and soil degradation, which can exacerbate flood damage. In the case of links between the support for energy in agriculture and the production of biofuels from agricultural feedstocks, further progress is required to develop policy coherence in the context of improving water resource management in agriculture.

More integrated and coherent policy approaches, however, are beginning to take shape. The restoration of land in flood plains by planting trees, for example, has helped to reduce flood impacts, improved water quality, and led to co-benefits, such as restoring biodiversity and sequestering greenhouse gases. There has also been progress in lowering overall agricultural support levels and in decoupling support from production and inputs. This is beginning to encourage more efficient use of water, better adaptation to water scarcity, and lower off-farm pollution, while well-targeted agricultural support can maintain farming systems in those countries where there is an association between farming and the provision of ecosystem services. But identifying and quantifying the overall economic efficiency and environmental effectiveness of agricultural and agri-environmental support on water resources is difficult and further analysis on causation is needed.

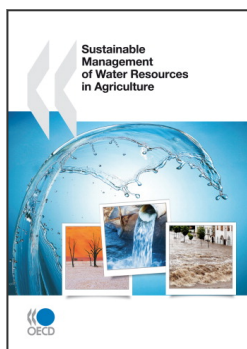
- ***Enhance agriculture’s resilience to climate change and climate variability impacts***

Many OECD countries are reporting the growing incidence, severity and costs of flood and drought events on agriculture. This has occurred from inappropriate land management practices and policies, and is being further exacerbated by climate change. In response countries are beginning to develop mitigation and adaptation strategies, including efforts to: improve food security and water use efficiency by farmers in areas of water scarcity; develop crops or change farm practices where climate change alters temperatures and precipitation; alter management practices that can contribute to slowing water transport across farmland and reducing flood damage in urban areas; and integrate sustainable water resource management in agriculture within the broader context of regional land use planning (e.g. the conversion of farmland to urban uses can increase flood costs as farmland has the potential to act as a flood sink).

These approaches are more likely to be effective if they are embedded in longer term strategies closely linked with overall agricultural policy reform, risk management policy and market approaches. Climate change will also require greater attention in agriculture to water saving practices both in terms of on-farm distribution systems and also the larger infrastructure systems delivering water to farms. Better understanding of the importance of extending risk management approaches in agriculture to existing climate variability, can also help build a more solid foundation for addressing climate change in the future.

- ***Address knowledge and information deficiencies to better guide water resource management***

As broader water reforms become more decentralised and complex (e.g. developing water trading, and changing water entitlements and institutional arrangements), policy implementation and evaluation needs to be underpinned by improving measurement of water resource availability and use, and developing knowledge, research, training and advice, monitoring and evaluation. There is a lack of transparency of information on water supply costs, while developing water markets and planning water allocation between different users and the environment requires detailed monitoring of water extractions and flows. The costs and benefits of agriculture’s use of water (e.g. groundwater depletion, flood mitigation) need to be more precisely defined to better inform policy decision making. Farmers also need more technical advice and education on best practices to adopt, especially as climate change may render past farm practices obsolete.



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