

Executive Summary

Contemporary Irrigation in the EU and Accession States

1. Agriculture is a significant user of water resources in Europe, accounting for around 30 per cent of total water use. The scale and importance of irrigation is significantly greater in the southern Member States but far from negligible in most northern Member States. In the south, irrigation accounts for over 60 per cent of water use in most countries, while in northern Member States it varies from almost zero in a few countries to over 30 per cent in others. In terms of the area irrigated and the amount of water used, water demand for irrigation is relatively insignificant in Ireland and Finland, modest in Sweden, Luxembourg and Denmark, of increasing regional importance in the UK, Belgium, the Netherlands, Germany, Austria and France, and nationally significant in Portugal, Spain, Italy and Greece.

2. Among the accession states, a similar pattern is found. Historically, irrigation accounted for very little water demand in the Baltic states; it had some regional significance in Poland, the Czech republic, Hungary and Slovakia, and it was particularly important in Bulgaria and Romania. However, since the collapse of the command economies in the last decade, the use of water for irrigation declined sharply in most countries and is only now beginning to creep back upwards.

3. Within the EU, many of the crops subject to irrigation consist of fruit, vegetables and other high value produce which do not receive a high level of market support under the Common Agricultural Policy (CAP). Potatoes are one of the main irrigated crops in northern Europe. However, the irrigation of crops receiving support under the CAP market regimes, including maize, rice, tobacco and olives is also significant, particularly in some Member States including Greece, Spain, France, Austria and Italy.

4. Because most irrigation is practised in southern Europe, it is overwhelmingly associated with large numbers of very small farms. Often, the availability of irrigation is critical to the viability of these farm businesses. The socio-economic importance of irrigated agriculture within the EC is therefore considerable.

Types and Trends in Irrigation

5. Traditionally, much of the irrigation practised in Europe has consisted of gravity-fed systems, where water is transported from surface sources via small channels and used to flood or furrow-feed agricultural land (furrow irrigation). In sizeable areas of the southern Member States including Portugal and Spain, this remains the dominant form of irrigation. However, in an increasing number of regions in both north and south, irrigation by sprinklers using pressure, often drawing water from subterranean aquifers, is the most common practice. It is often in these areas where the quantities of water used, and thus the impact on the environment, can be most severe.

6. The area of land irrigated has risen in several Member States in recent years but the pattern is variable. Since 1980, the irrigated area as a proportion of total land area in the EU15 has risen almost consistently year on year, from around 2.9 per cent to over 3.5 per cent today, but this masks significant variation between the countries. In some Member States the most rapid increases were during the 1980s and growth has been slower since then (eg Spain, Portugal,

Italy), while in others the most significant expansion has been over the last decade (eg France, UK).

7. In the past, the substantial expansion of the irrigated area in several Member States including France and Spain, has been influenced by policy measures supporting the provision of irrigation infrastructure and providing subsidies to farmers installing irrigation equipment, as well as guaranteeing low water prices for agriculture. In most CEECs the area of irrigated land has fallen sharply since the late 1980s and there has also been a sharp decline in the new Länder of Germany over the same period.

8. Technical change has resulted in a series of significant transformations in irrigation technology. The most recent drip systems tend to be more efficient in their use of water but they are often far too costly to be within the means of the majority of small irrigators in the south. Thus the adoption of the most efficient water use systems tends to be concentrated in regions where farms are relatively large businesses, crops are high-value and/or water pricing is well established (eg Netherlands, UK, some regions of Spain and Italy).

Agricultural Water Management and Pricing

9. Institutional arrangements for the management of irrigation vary considerably at national and local levels. They range from systems involving unregulated, private abstractions (ground or surface) by large numbers of small producers, to centrally controlled irrigation systems, usually public-funded and owned, where collective management decisions can be made. There are also systems where the rights to abstract may be given or sold by public authorities to private individuals, either for a limited time and quantity of water use, or without specific conditions. In some cases, use rights may be transferable between landholdings, whereas in others they are tied to the land. The variation in management arrangements is found as much within individual countries as between them.

10. In many countries but particularly among southern Member States, there is strong public-sector involvement in building water supply infrastructure and managing irrigation systems. In countries such as Spain and Greece with large irrigated areas, the promotion of irrigation has been an important strand of rural development and agricultural policies.

11. Water management in many southern Member States is a highly charged political issue. This study gives one example of how attempts to control water use through regulation may be almost entirely ineffective due to a combination of local resistance to these measures and the high economic value of continued irrigation to agriculture in these areas.

12. Agricultural water pricing does not follow a consistent pattern between Member States but the overall level of prices is relatively low. In the EU as a whole, especially where large, collective irrigation networks are managed by public bodies, the price of water to farmers rarely reflects its full resource and environmental cost.

13. A number of countries are beginning major reforms of water supply policies, including moving toward a greater degree of cost recovery for water supplied to agriculture. In water management, the trend appears to be towards more organised approaches with user rights and charges or the formation of user groups to manage water in the collective interest (which may be broadly or more narrowly defined).

14. In the accession countries, the collapse of the command economies also led to the decline and collapse of irrigation management. Prior to this, water use was collectively organised and funded. Today, some countries are charging increasing amounts for abstraction (eg Hungary) while most others have yet to reach this point.

15. Although the study has not included an analysis of the impact of “full cost recovery” prices it is generally assumed that these would prompt a considerable reduction in the use of irrigation water and a more limited programme of investment in new schemes in future. There is still a long way to go until a systematic approach and the full internalisation of the external costs of water use (including its environmental impacts) are achieved. Indeed, the removal of the proposal for full cost recovery from the draft text of the Water Framework Directive, which is currently proceeding through EU negotiations, suggests that it will be some time before concepts such as this become accepted by the majority of Member States.

16. For these reasons, it is anticipated that irrigation and its environmental impacts will continue to be a concern for the European Union.

Environmental Impacts

17. The environmental impacts of irrigation are variable and not well-documented in many EU Member States. The information presented in this study draws from a mix of expert opinion, case studies and published empirical research, but the latter is much more abundant in some countries (notably, Spain) than in many others.

18. This evidence suggests that some environmental impacts can be very severe, as demonstrated in case-studies from four Member States. In general, the regions with the most severe problems of permanent resource pressure are concentrated in the southern Member States, whereas these pressures are often only severe during drought periods in the northern Member States. Impacts are usually site specific, and they can be profound, even where they may occur only for a relatively short period.

19. Across Europe as a whole, the main types of environmental impact arising from irrigation appear to be:

- water pollution from nutrients and pesticides;
- damage to habitats and aquifer exhaustion by abstraction of irrigation water;
- intensive forms of irrigated agriculture displacing formerly high value semi-natural ecosystems;
- gains to biodiversity and landscape from certain traditional or ‘leaky’ irrigation systems in some localised areas (eg creating artificial aquatic habitats);
- increased erosion of cultivated soils on slopes;
- salinisation, or contamination of water by minerals, of groundwater sources;
- both negative and positive effects of large scale water transfers, associated with irrigation projects.

20. Of these, the most significant problems are indicated in relation to:

- a combination of over-abstraction of groundwater supplies, salinisation and severe pollution by nutrients, pesticides and other farm inputs in significant areas of intensive irrigated agriculture. These include the Spanish interior, many parts of the Mediterranean coastline from southern Portugal across to Greece, and some localised areas in northern Europe including parts of the Netherlands – these problems are exemplified in case studies from southern Europe (Daimiel, Dalias and Argolid);
- soil erosion, arising both from intensive irrigation itself, and from the abandonment of formerly hand-irrigated, traditional terrace agriculture in the hills. Erosion is a serious concern in some southern Member States including Spain, Portugal and Greece;
- the dessication of former wetlands and the destruction of former high nature value habitats including dryland arable, low intensity pastures and sensitive aquatic environments by the expansion of irrigated agriculture and its knock-on effects. This was historically a problem in many Member States, and continues to be significant in particular regions of both southern and northern Europe (eg west France, inland Spain, Hungary, southeast England). The case study of Tablas de Daimiel in Spain presents a fairly extreme example of the potentially devastating consequences of such processes, while that of the Beauce in northern France indicates how similar but less extreme issues can occur even in more temperate conditions.

21. There is a clear north-south divide apparent in these impacts. Certain impacts are common among southern Member States and relatively absent in the north (eg salinisation), while others occur in most countries but are generally more severe in the south than the north (eg nutrient pollution, erosion, habitat loss and degradation). However, in the longer term, climate change could increase the severity of drought periods and aggravate resource pressures in many regions of Europe. Particular crises in water availability are predicted for Spain, while in more northern Member States, including France, the UK and Germany, the frequency and severity of periodic drought is expected to increase, potentially driving a greater economic need for irrigation.

22. In central and eastern Europe data on the environmental impacts of irrigation is even more limited. Nonetheless, there are concerns in some countries. If the area of agricultural land under irrigation were to expand substantially, with or without Community assistance, certain pressures could be expected to increase. At the same time, there is clearly scope for improving existing irrigation schemes. More detailed analysis could help to set priorities for investment in irrigation and associated rural infrastructure, in the coming years.

Ameliorating Environmental Impacts

23. A variety of measures is available for mitigating the negative impacts of irrigation and enhancing environmental benefits where these are achievable. Some of these are technical or site specific but many could also involve policy changes and adjustments to the institutional management of water at national and regional levels.

24. Some technical measures can be applied to increase the efficiency of irrigation systems, reducing both abstractions and soil erosion, for example, switching from sprinklers to drip irrigation. However, the environmental gains may be very limited if more efficient techniques do not result in lower net water use, but simply allow an increase in irrigated volume or area.

In practice, major investment in new technology can be extremely costly and may therefore be beyond the reach of many small, private irrigators.

25. Member States can take steps to identify and exploit new sources of water previously not used in irrigation, in order to reduce overexploitation of existing sources. This can include large-scale and long-distance water transfers. However, these kinds of development can themselves cause serious negative environmental impacts if not adequately planned and scrutinised in advance.

26. It is possible to adopt less environmentally damaging or more beneficial agricultural practices associated with irrigated farming. Integrated management systems which reduce the use of fertilisers or pesticides, and mixed cropping practices which preserve greater diversity in habitats and landscapes, can both bring benefits. Farmers can switch to organic or integrated production methods, or take certain, most sensitive areas of land out of irrigated cropping (eg to create buffer zones adjacent to valuable habitats). These kinds of change could be particularly valuable in the most intensively irrigated areas.

27. There is a range of possible measures to reduce the quantity of water used in irrigation in order to mitigate environmental damage. These include economic and regulatory policies such as water metering, charging, licenses and time-limited abstraction permits. Controls over where irrigation can be practised can also avoid damage. Such measures are within the competence of different authorities, including regional and national government, water management institutions and other more local organisations.

28. The incentives available to farmers provide another avenue for encouraging best practice in irrigation. Relevant policies include compensation payments for irrigated crops under the CAP (with appropriate cross-compliance conditions) and agri-environment payments under Regulation 2078/92 and its successor in the rural development Regulation, 1257/1999. Examples of policy options at EU level are summarised in paragraphs 30-40.

29. The full implementation of existing and proposed new EU environmental Regulations in the Member States and accession countries will be an important factor in mitigating the negative environmental impacts of current and future irrigation. In particular, this study has highlighted the nitrates Directive, the habitats Directive, the Environmental Impact Assessment Directive and the forthcoming Water Framework Directive, as key policies.

Policy Recommendations – Member State Policies and Water Management Structures

30. Many of the measures required to reduce negative impacts require action at Member State level. These include the following.

- Appropriate hydrological and land use planning procedures to take a strategic overview of national water supplies, demand and trends in demand and supply.
- The development of stronger institutional structures and legislation to allocate property rights (including user rights) in ways that will support the optimal and environmentally sensitive use of limited water resources, and encourage local ownership of such policies.

- Policy developments could include the adoption of water charging regimes which internalise external costs, policies to establish collective management structures, and more widespread use of metering and independent enforcement in relation to environmental protection.
- The promotion of appropriate technologies through advice and demonstrations of best practice, supported by further research on environmental impact and valuable sites, to identify new technical options to address problems.
- In regions with particularly severe problems, a combined approach involving advice and support to encourage reduced and/or more efficient use of water, with strong enforcement of water charges and appropriate abstraction limits on users.

Policy Recommendations – EU Policy Implementation and Development

Agricultural Policy

31. New or enhanced use by Member States of agri-environment, less-favoured area and rural development measures under EC Regulation 1257/99 could include the following:

- more widespread payments to support organic or extensive rice production, or traditional mountain-terrace agriculture;
- greater support to maintain environmentally valuable dryland farming systems against the threat of abandonment or transformation to irrigated agriculture;
- payments used in combination with appropriate aids for training and investment, to encourage the adoption of more water-conserving strategies and techniques;
- the development of integrated projects under Regulation 1259/1999 to promote longer-term sustainability of environmentally beneficial systems of irrigated agriculture, combining agri-environmental schemes, marketing, processing, eco-tourism and other economic development aids, increasing their ability to compete successfully.

32. The Commission and competent national authorities should ensure thorough scrutiny of plans and projects to ensure that investment and other aid under the new rural development plans does not promote the development of irrigation in ways that will cause environmental damage. This should include scrutiny of ex-ante appraisals, mid-term reviews, and the production of guidance for Member States on how to meet the obligations of environmental protection under the reformed CAP.

33. Cross-compliance options for the Member States could include the following:

- where supported crops are grown using irrigation and water authorities have insufficient control over levels and conditions of use, conditions placed on the receipt of direct payments could require farmers to have licences and water meters as well to observe existing and forthcoming water control legislation;
- conditions could be applied to limit input use on supported, irrigated crops such as maize, rice, olives, cotton and tobacco, or to require the use of drip-irrigation to minimise erosion

in 'erosion vulnerable zones', alternatively, all irrigated crops receiving support could be subject to nutrient or soil conservation management plans.

Environmental Policies

34. The full implementation of the nitrates Directive in the Member States will be an essential mechanism for addressing and ameliorating the serious pollution problems associated with intensive, irrigated agriculture in many parts of Europe. The forthcoming water framework Directive should also be helpful in reducing over-abstraction and related quality problems, by requiring the prior authorisation of all water abstractions and requiring catchment plans, which include measures to achieve 'good water status' for all surface and groundwaters, by the end of 2010.

35. The full implementation of the habitats Directive should also help to address biodiversity issues. Irrigation projects which are likely to cause damage to valuable sites or important species should be prevented or addressed by modifications, before such development is permitted. Achieving favourable conservation status for designated Natura 2000 sites and species will also require any damaging irrigation practices to be addressed.

36. It will also be important to ensure that the EIA Directive is fully implemented, particularly in respect of Annex 2 projects involving agricultural intensification on semi-natural or uncultivated land. EIA should also be undertaken in accordance with consistent quality criteria which ensure that the full environmental impacts of irrigation are assessed and evaluated. Member States must have effective means of prohibiting or modifying proposed irrigation developments where necessary, and ex-post reporting of environmental impacts should be compulsory.

37. The Commission will need to continue to take measures to encourage a swifter and more ambitious implementation of all these Directives at Member State level. A wider promotion of best practice examples could be valuable, as well as a closer linkage between the requirements of the Directives and the implementation of key related EU policies within the Member States, notably agriculture and regional development policies.

Regional Policy and Structural Funds

38. The Commission should encourage the establishment of consistent data on the most sensitive and vulnerable sites in relation to irrigation, from an environmental perspective (eg those most vulnerable to salinity, erosion, pollution, etc), to allow the most potentially damaging new irrigation or irrigation enhancement projects to be identified and avoided. As with rural development policies, EC guidance should make it clear that Member States have an obligation to exercise detailed and thorough environmental scrutiny in their regional and national appraisal systems, to identify potential negative environmental impacts and to take appropriate action.

Accession Policy

39. Similar principles as those which apply to the Rural Development measures under the CAP, and measures under Regional Policy, should also be applied to SAPARD and ISPA plans and projects. Good practice guidance could be valuable for those countries where

irrigation was formerly important and where it is likely to increase in future, as well as ex-ante evaluation of the reinstatement of irrigation, in order that limited resources are targeted using environmental as well as economic criteria.

Research and Information

40. This study has been hampered by the lack of consistent data on irrigation itself, and on related water management structures and procedures. The Commission should consider the adoption of a common classification system of irrigation to be used in gathering data within the Member States. The establishment of a database on irrigation and its impacts could be very valuable in determining future priorities for resources and new initiatives, furthering a greater strategic awareness of environmental risks in relation to irrigation within Europe.

41. More focused research to identify, analyse and promote examples of best practice in minimising or ameliorating environmental impacts of irrigation would also be beneficial. This should be drawn from different areas of Europe and further afield, where similar issues occur (eg California, Australia). Also, climate change research should include specific studies of impacts upon water resources and agricultural water demand, in the EU.