UNDP/GEF Danube Regional Project

Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation in the Danube River Basin

Workshop on Promoting Best Agricultural Practice in the Danube River Basin

Project Output 1.2:
Policies for the Control of Agricultural Point and Non-point Sources of Pollution

6 – 7 October 2003, Zagreb, Croatia

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GFA Terra Systems
in co-operation with Avalon

Danube Regional Project
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Introduction to the Workshop

This 2 day workshop was organised within the framework of Output 1.2 of the UNDP/GEF Danube Regional Project (DRP)UNDP/GEF Danube Regional Project (DRP). The specific aim of Output 1.2 is promote *"reduction of nutrients and other harmful substances from agricultural point source and non-point sources through agricultural policy changes"*.

The first phase of Output 1.2 is preparatory and is being undertaken by GFA Terra Systems (Germany) in co-operation with Avalon (Netherlands). The GFA Terra Systems/Avalon consultancy team consists of 6 international consultants and a network of 35 national experts in the 11 central and lower DRB countries eligible for UNDP/GEF assistance. The main focus of their work has been:

- Updating available information on the use of agro-chemicals in the 11 central and lower DRB countries
- Supporting the development of existing DRB inventories of point source and non-point source agricultural pollution
- Surveying and reviewing the current state of policy development for controlling agricultural pollution in the central and lower DRB
- Identifying priorities for the strengthening of agricultural pollution control policies in the DRB
- Preparing a general concept of Best Agricultural Practice for promoting farm management practices which are less polluting

This workshop was a key activity that brought together a unique cross-section of policy-makers in agriculture and water quality from all 11 central and lower DRB countries, together with the GFA national experts and consultants, to participate in discussion of the problems and potential practical solutions associated with agriculture and water pollution in the region. The specific objectives for the workshop were as follows:

1. To develop understanding of EU policy developments regarding agricultural pollution and "good/best agricultural practice"
2. To present information collected on a) agrochemical use in the DRB and b) current status of agricultural pollution control policies
3. To introduce and discuss a draft concept of Best Agricultural Practice (BAP) for the DRB

The workshop was structured to balance a number of presentations from keynote speakers and consultants with the opportunity for discussion and feedback at a national level. There were two "break-out" sessions during the workshops during which the national representatives were divided into 3 working groups according to their country's status regarding EU accession (i.e. the main "driving force" for policy reform in the region at present). These working groups were:

A: EU Accession Countries (accession in 2004) - Czech Republic, Slovakia, Hungary and Slovenia

B: EU Pre-accession Countries (accession after 2004) - Romania, Bulgaria and Croatia (currently preparing its application for EU membership)

C: EU Non-accession Countries - Bosnia & Herzegovina, Serbia & Montenegro, Moldova and Ukraine

The topics of discussion for the two "break-out" sessions were:

a) Priorities for further policy development in the central and lower DRB

b) Promoting the concept of Best Agricultural Practice for agricultural pollution control in the DRB

The workshop concluded with a session (including technical visit) on "putting principles into practice" and focussed upon organic farming as *one* example of how the principles and practice of BAP can be integrated within a well developed and regulated system of alternative agriculture with a strong link to consumers. The relationship between environmentally-friendly production methods and good quality food was reinforced during the workshop by the catering arrangements which used predominantly fresh, local ingredients from the organic farm that the participants subsequently visited.

Summary of Workshop Presentations

The Emerging Concept of "Good Agricultural Practice" in the Implementation of EU Policy and Legislation

Dr Karlheinz Knickel, Institute for Rural Development Research, Frankfurt

Environmental baselines in agriculture are gaining increasing importance as minimum standards for agricultural support payments, entry conditions for participation in agri-environment schemes, or as part of quality assurance schemes. The main aim of this keynote presentation was to provide some essential background on the current EU policy context regarding agricultural pollution and the concept of "good agricultural practice" (GAP). Particular emphasis was put upon the way that the concept of GAP has emerged, its role in the overall context of EU policy and legislation, and the present situation.

Good Agricultural Practice (GAP) currently represents a baseline (a "red line") of environmental standards that apply to all farmers in the EU. Farmers are expected to comply with this GAP without any expectation of financial reward. However, above this baseline of GAP farmers become eligible for incentives (voluntary measures) or compensation (obligatory measures) in return for meeting society's preference for higher standards.

This principle is defined in the text of the EC Rural Development Regulation (No. 1257/1999) and is elaborated further in the associated implementing regulation No. 445/2000. All EU Member States (and those countries preparing for accession to the EU) are required to establish *"verifiable standards of usual good agricultural practice"* - where usual good agricultural practice is the standard of farming which a reasonable farmer would follow in the region concerned. In order to be eligible to receive support from agri-environment schemes and less-favoured area schemes, farmers must follow these verifiable standards across the whole of their farm. Competent national authorities must be able to check compliance with thees verifiable standards.

The EU concept of GAP allows for some flexibility in order to match local conditions (varying natural/physical conditions) and to allow for development over time (technological change). In any one region/country it may comprise:

- mandatory environmental legislation (EU, national and regional/local)
- other binding or semi-obligatory measures (such as formal "Codes of Good Agricultural Practice" established in accordance with the EC Nitrate Directive)
- further elements (e.g. standards promoted by extension services and relevant technical standards)

The Water Framework Directive and Agricultural Pollution Control in the DRB

Yanka Kazakova, WWF Danube-Carpathian Programme, Sofia

The EC Water Framework Directive (No. 2000/60) – the WFD - is an ambitious piece of legislation that provides a "blueprint" for water management in Europe (and elsewhere) for the next 20 years. The WFD obliges European countries to prevent further deterioration of all ground and surface water resources, and to further protect, enhance and restore all waters with the aim of achieving "good ecological and chemical status" by 2015. Preparation for application of the WFD is mandatory in all EU Member States and the 12 countries preparing for accession to the EU. There is also a non-mandatory commitment to the application of the principles of the WFD in Switzerland, Norway, parts of Russia, all ICPDR member countries, etc.

WWF sees the Water Framework Directive (WFD) as an important tool to a) ensure rational, more "eco-efficient" use of water and wetlands across Europe and b) to conserve and restore the functions and integrity of freshwater ecosystems - both in terms of its "result" ("good status") and "process" obligations (IRBM – integrated river basin management).

IRBM is the framework within which measures for achieving 'good status' are to be implemented. The countries must ensure that the necessary technical and institutional infrastructure is in place (including spatial definition of pressures and impacts, e.g. *agricultural*). Where necessary IRBMs take account of trans-boundary basins requiring joint management between two or more countries.

The precise measures to be taken within a given river basin will vary widely according to natural, socio-economic and cultural factors. The Directive foresees that the choice of measures will be taken according to what is most appropriate at the basin level (in turn reflecting what is appropriate for a given region or country).

Central elements of the WFD also include:

- **Water pricing** – to act as an incentive for the sustainable use of water resources and thereby contributing to achieving environmental objectives and helping to reduce unnecessary consumption (*over-use of water for irrigation)*, and
- **Public participation** – in recognition that solutions to current water problems need to be 'bottom-up' as well as 'top-down' (*incl. farmer's associations, water users associations, etc*.).

Regarding agricultural pollution – there is considerable potential to utilize various instruments available in the Common Agricultural Policy (and to some extent Structural/Cohesion Funds) in order to promote better management practices by farmers and reduce the pressure upon water resources from agriculture.

Problems Associated with Pesticide Use in the DRB

Lars Neumeister, GFA Terra Systems, Hamburg

Pesticide usage in the central and lower DRB countries has declined significantly since the early 1990s. The aim of this work was to prepare an inventory of those pesticides still in use in the DRB countries under study. The approach taken was to focus upon a total of 24 so-called **priority pesticides** for the DRB – these are pesticide substances that regularly occur in the aquatic environment of the catchment and are of special concern for environmental and/or human health reasons. Of these, only three priority pesticide are authorized in all DRB countries; seven are not authorized in any DRB country, and; some are restricted in some countries.

The priority pesticides currently in use are all "high use" pesticides. The most widely used pesticide substance in the region is copper, but since this is relatively immobile it represents more of a localized soil pollution problem than a water pollution problem. The next most commonly used pesticide was the herbicide Atrazine, followed by the herbicides 2,4-D, Alachlor and Trifluralin.

The problems commonly associated with their use are:

- uncontrolled and illegal trade of pesticide products
- high pesticide use in certain areas and on certain crops (e.g. Atrazine is mostly used in maize, Alachlor in maize, rape seed and sunflower, and copper compounds in vineyards, orchards and in vegetables including potatoes)
- poor storage of pesticides, including old pesticide stores
- use of pesticides in excess of recommended rates
- unauthorised use of pesticides on crops they are not registered for
- cleaning of spraying equipment and disposal of unused pesticide, pesticide containers and "spray tank washings" nearby to or even in water courses
- drift of pesticide spray to adjacent areas due to the old spraying equipment used
- lack of knowledge of and/or compliance with obligatory "buffer zones" for surface waters and other protected areas
- poor timing of pesticide application

Problems Associated with Fertiliser Use in the DRB

Mark Redman, GFA Terra Systems, Hamburg

Mineral fertilisers and animal manures are traditionally applied to agricultural land to improve the supply of crop nutrients and enhance crop growth. However, when surplus crop nutrients (N & P) "leak" from agricultural land into the wider environment they are a potential environmental pollutant. Mineral fertilisers and animal manures therefore need to be carefully managed (quantity and time of application) by farmers in order to reduce the risk of surplus nutrients accumulating and "leakage" occurring.

The rapid decline (40-50 kg N/ha) in the N balance of agricultural land in central & lower DRB countries since the late 1980s suggests that there has been a significant reduction in the risk of diffuse N pollution from agriculture – this is associated both with the significant reduction in N fertiliser use by farmers in the region and the 50% decline in livestock numbers.

There are now indications that fertiliser use by farmers in the region is increasing again with an 18% increase in total fertiliser N consumption (thousands tonnes/year) by all central and lower DRB countries during the period from 1997–2002. Not surprisingly, the increase in fertilizer N use greatest (up to 30%) in those countries preparing for EU accession in 2004 and there are concerns that this trend will continue with the implementation of the CAP in these countries.

Despite the relatively low levels of fertiliser use and manure production in most central and lower DRB countries, the risk of significant nutrient loss to waters is increased greatly by a number of "bad practice" by farmers that are consistently reported in all countries, including:

- bad timing of fertiliser application
- spreading fertiliser and manure on frozen and snow covered ground, sloping land and too close to surface waters
- not considering the nutrient requirements of the crops that fertilisers (and manures) are applied to e.g. over-application of fertiliser N at the time of sowing
- treating manure as a "waste" product rather than a valuable source of nutrients – this commonly leads to the over-application manure and slurry to small areas of land
- in the poorest rural areas, manure is often dumped in village waste heaps, streams, pondswaste heaps, streams, ponds etc.
- manure storage facilities are often poor - without adequate storage facilities, manures are often applied to land at inappropriate times when there is high risk of leaching or run-off

The promotion of even the most basic "good practice" for farmers should be a high priority for national governments and will benefit both farmers (through improved efficiency, productivity and profit) and the environment.

The Current State of Agricultural Pollution Control Policies in the DRB

Jaroslav Prazan, GFA Terra Systems, Hamburg

In order to be effective at improving the management practices of farmers, policies for reducing agricultural pollution should include three effective components - a *policy strategy* (or number of strategies), *policy instruments* and an *implementation structure.* The purpose of this review was to develop understanding of the existing policy context regarding agricultural pollution control in the 11 central and lower DRB countries - in particular, to classify, describe and analyse 4 key issues:

1. The current policy objectives and strategies of the different Danube River Basin (DRB) countries regarding the control of water pollution caused by agriculture
2. The various policy instruments and practical measures that are currently used to promote the control of agricultural water pollution – including a) regulatory, b) economic, c) advisory/informative and d) project-based instruments/measures

3. The overall effectiveness of the "policy mix" used to control agricultural water pollution
4. The effectiveness of the institutional arrangements that are operating to implement the various policy instrument and measures

Strategies - all national experts reported some goals for water protection in their countries, although there is a general lack of clear and targeted strategies for water protection that integrate different policy measures and show the necessary path to the achievement of indicated goals. Most progress towards the development of comprehensive water protection strategies is made in those countries preparing for EU accession in 2004

Regulatory Instruments – many of the main agricultural pollution issues (nutrients, pesticides, farm waste and erosion) are addressed by existing regulatory instruments in the DRB countries, with the most extensive coverage of issues in those countries preparing for EU accession in 2004. In most other countries, existing regulatory instruments tend to be rather general with relatively few specific regulatory instruments in place. Consequently there is much potential to prepare more targeted instruments to prevent water pollution through the control of specific farming practices – also to improve compliance and enforcement.

Economic Instruments - economic instruments may be incentives or disincentives and can be an important tool for modifying the management practices of farmers and reducing agricultural pollution. However, effective measures (or mixes of measures) need to be well-designed and balanced – as well as successfully implemented. Not surprisingly, the economic instruments used in the DRB countries are mainly disincentives due to the lack of financial resources to introduce incentive schemes. Where economic instruments are in place they do not currently address all pollution issues in all countries. The number of incentive measures in the four acceding countries (CZ, SK, SI, HU) is expected to increase in 2004 with EU accession and the availability of EU co-financing for rural development measures, such as agri-environment programmes.

Advisory/Information Instruments - the transfer of knowledge and information to farmers via advisory/informative instruments can play a key role in changing the management practices of farmers and reducing agricultural pollution. However, the most frequent limitation upon this type of instrument for controlling agricultural pollution in the DRB is that the actions taken are too small with insufficient staff and financial resources. There is large potential to further develop advisory/information instruments in all countries.

Project Based – there are various types and sizes of projects targeting the prevention of agricultural water pollution with a tendency towards research and policy implementation in those countries working towards EU accession in 2004 and later.

Based upon the results of the policy review, the following general recommendations were made for all central and lower DRB countries:

- to design more targeted and integrated strategies for the control of agricultural pollution
- to improve the control and enforcement of regulatory instruments for agricultural pollution control
- to put more emphasis upon the design and implementation of advice/information measures for agricultural pollution control
- to develop within available resources financial incentives as appropriate economic instruments for promoting agricultural pollution control
- to promote organic farming and integrated crop management techniques as viable alternatives to the use of agrochemicals
- to design and implement standards of Good Farming Practice
- to increase farmer and advisor awareness of the importance of agricultural pollution control
- to support capacity building amongst relevant stakeholders for the implementation of agricultural pollution control policies

Policy Recommendations for Pesticide Use

Lars Neumeister, GFA Terra Systems, Hamburg

The national governments of all central and lower DRB countries should aim to effectively control pesticide pollution in order to minimise the risks presented to human health, the quality of environmental resources and the integrity of natural ecosystems in the region. The following objectives are recommended for all national strategies aiming to control pesticide pollution from agriculture:

1. Reduce the levels of harmful active substances used for crop protection by prohibiting and/or substituting the most dangerous priority pesticides with safer (including non-chemical) alternatives, including the introduction of:
   - A ban on the use of certain pesticide active ingredients – notably the use of Atrazine, Lindane, Diuron and Endosulfan
   - Pesticide phase-out - the use of all other priority pesticides should be reduced to a minimum and their use phased and substituted by less-dangerous pesticides, including non-chemical alternatives
   - Cut-off criteria need to be defined in order to prevent the replacement of the priority pesticides which are banned or phased out with other hazardous pesticides
2. Improve controls on the use and distribution of pesticides, including:
   - More monitoring of pesticide trade
   - More strict control of pesticide trade - all central and lower DRB countries must work towards stopping the uncontrolled and illegal trade of pesticides.
   - Raise awareness amongst farmers and agricultural extension services about the dangers of illegal and often unlabelled pesticides
   - Effective monitoring of pesticide use e.g. mandatory requirement for all farmers and pesticide operators to keep pesticide use records according to certain minimum standards
   - Elimination of obsolete pesticides
3. Encourage the proper use of pesticides by farmers and other operators, including:
   - Raise farmer awareness of the dangers of improper pesticide use and the importance of the safe storage, handling and disposal of pesticide products
   - Develop national codes of good practice
   - Mandatory training for all farmers and other operators who wish to purchase and apply pesticides
   - Develop appropriate extension capacity for promoting good practice in use of pesticides (including link to progressive and well-funded research programmes)
   - Use appropriate economic instruments to promote good practice
4. Promote certified organic farming, together with integrated crop management (ICM) systems, as viable alternatives to conventional pesticide use. This should include:
   - Raise farmer awareness of organic farming and ICM as viable alternatives to conventional pesticide use,
   - Develop relevant legislation for the certification and inspection of organic farming systems in compliance with internationally recognised standards
   - Develop appropriate extension capacity for the re-orientation of farmers towards alternative production systems, such as organic farming and ICM
   - Develop on-farm "Quality Assurance Schemes" to promote the trade and sale of food products that have been grown with reduced or minimal pesticide inputs
   - Use appropriate economic instruments to encourage farmers to convert to organic farming and ICM methods

Policy Recommendations for Fertiliser Use

Mark Redman, GFA Terra Systems, Hamburg

Despite the relatively low levels (compared to many EU Member States) of mineral fertiliser and manure currently applied to agricultural land in the central and lower DRB region, national governments should take seriously the risk of diffuse pollution arising from fertiliser and manure application.

The following objectives relating to fertiliser and manure application were recommended for all national strategies aiming to control nutrient pollution from agriculture:

1. Develop greater understanding at a national/regional level of the relationship between agricultural practice (fertiliser, manure and land management) and the risk of diffuse nutrient pollution – notably through the establishment of progressive and well-funded research programmes
2. Develop appropriate policy instruments and institutional arrangements for promoting better management of fertilisers and manures – including:
   - Raise farmer awareness of good practice for better management of fertilisers and manures
   - Develop and promote national codes of good practice
   - Use appropriate economic instruments to promote good practice
   - Develop appropriate extension capacity (including the link to progressive and well-funded research programmes as above)
3. Promote certified organic farming and other low input farming systems as viable alternatives to the conventional use of fertilisers, including:
   - Raise farmer awareness of the potential of alternative farming systems, such as organic farming
   - Develop relevant legislation for the certification and inspection of organic farming systems in compliance with internationally recognised standards
   - Develop appropriate extension capacity for the re-orientation of farmers towards alternative production systems
   - Use appropriate economic instruments to promote organic farming

A Draft Concept for Best Agricultural Practice (BAP) in the DRB

Mark Redman, GFA Terra Systems, Hamburg

The objective of developing a concept of "best agricultural practice" (BAP) under Output 1.2 is to support the design of new agricultural pollution control policies for the central and lower DRB countries – as well as encouraging compliance with existing and emerging national legislation (including that driven in many countries by the process of EU accession) – that will promote the greater integration of pollution control considerations into the day-to-day management of crops, animals and agricultural land by farmers in the central and lower DRB.

For the purposes of this project, the term "best agricultural practice" (BAP) is only applied to farm management practices that reduce the risk of pollution occurring from **agricultural non-point sources** in the DRB – this includes classical diffuse pollution and "small point source" pollution arising from multiple, small-scale (and often accidental) discharges that occur from different farming activities.

There are no concrete and universal definitions available for what is or is not best agricultural practice (BAP). A strict or prescriptive definition of BAP has therefore been avoided– instead we have proceeded with the understanding that BAP actually encompasses a broad spectrum or **hierarchy of activities** that must be interpreted according to local agronomic, environmental, social and economic context. Not all elements of this hierarchy are relevant in all countries of the central and lower DRB – instead Best Agricultural Practice is defined as:

> **"…the highest level of pollution control practice that any farmer can reasonably be expected to adopt when working within their own national, regional and/or local context in the Danube River Basin"**

With this BAP can be applied as a uniform concept across the whole DRB, but the level of environmental management/performance that we can expect from farmers in different regions/countries will vary significantly according to:

a) the agronomic, environmental and socio-economic context in which they are operating
b) the availability of appropriate policy instruments for encouraging farmers to "move up" the hierarchy and adopt more demanding pollution control practices
c) the availability of appropriate knowledge and other technical resources for supporting farmers to "move up" the hierarchy and adopt more demanding pollution control practices

The objective of policy strategies for agricultural pollution control in the different DRB countries should therefore be to encourage farmers to "move up" the BAP hierarchy as far as possible in the context in which they operate and deliver the highest level of pollution control that it is feasible for them to do. The function of available policy instruments and measures for achieving this "shift" can be summarised as follows:

a) **Disincentives** for dropping below the minimum level of environmental management practice that is acceptable
b) **Appropriate interventions** for promoting and sustaining the minimum level of environmental management practice on as many farms as possible, and
c) **Incentives** to go beyond the minimum level of environmental management practice and deliver a higher level of environmental performance

Obviously the pursuit of such strategies will require a combination of policy instruments – the so-called "policy mix" - to achieve optimal pollution control and a number of additional factors will influence the selection of these instruments, including environmental effectiveness, economic efficiency, equity and accessibility to farmers, administrative feasibility and cost, and political acceptability.

Recommendation on Best Available Techniques (BAT) for Agro-industrial Point Source Pollution

Stanislav Juran, ICPDR Emissions Expert Group

Agricultural point source pollution arises from single, discrete sources which are commonly associated with large-scale animal production units/installations that are regulated by discharge consent or control. Because of the industrial nature of these larger livestock units it is appropriate to refer to these farms as "agro-industrial units" (defined according to criteria based on number of animals) and therefore to also refer to **agro-industrial point source pollution**.

The management practices used to control pollution from such units/installations are referred to as Best Available Techniques" (BAT) rather than BAP. Recommendations on BAT for agro-industrial point sources of pollution have been elaborated by the EMIS Expert Group of the ICPDR under three main headings:

1. Technical In-Plant Measures for the Reduction of Waste Water Volume and Abatement of Pollution Loads

- Priority of application of manure on farmland over treatment and discharge into surface waters
- Energy recovery through anaerobic pre-treatment
- Prohibition of direct discharge of manure into groundwater
- Separate collection and treatment of solid and liquid manure (except deep litter)

- Automatic control of storage of liquid manure and of treatment processes
- Installation of safety mechanisms to prevent overfilling of liquid manure storage vessels
- Priority of mechanical cleaning over cleaning with liquids
- Use of vapour condensates for cleaning operations
- Use of biodegradable cleaning agents
- Use of peroxyacids instead of chlorine-containing cleaning agents and disinfectants (for control of epidemics), to avoid generation of hazardous chlorinated substances
- Controlled discharge of waters containing disinfectants in order to protect subsequent biological treatment steps
- Separate collection and disposal of disinfectant rests and used concentrates
- Separate sludge treatment
- Waste water discharges and the application of manure on farmland should be in accordance with the relevant regulations and the permits issued by the authorities

2. Reduction of Pollution Load by End-of-Pipe Measures

Agroindustrial point sources which discharge more than 100 m^3/d either directly into water bodies should meet certain requirements:

BOD_5	25 mg/l	70 – 90 %
COD	125 mg/l	75 %
tot-N	15 mg/l *	70 – 80 %
tot-P	2 mg/l	80 %

* for plants with a raw waste water load more than 100 kg/d tot-N (according to the standard N-values of annex 1) and if temperature in biological reactor is above 12 °C

3. Improvement Environmental Management

The objective of the following measures is to improve the environmental management and co-operation between the agro-industrial units and the environmental authority issuing permits, as well as other organisations/institutions:

- the plant should provide a list with the number of animals per category (comparable to Annex 1) and the quantities and eco-toxicological properties (safety data sheet) of cleaning agents and disinfectants to the responsible environmental authorities
- control and reporting procedures should be specified by the responsible environmental authority
- the authorities should take into account the promotion of pilot projects in order to establish examples for other plants
- development and exchange of information including the work of farmers associations and research should be intensified

Integrated Production and Organic Farming in Croatia

Zelijka Gudelj-Velaga, Ministry of Agriculture for Croatia, Zagreb

There are a total of 3.2 million hectares of agricultural land in Croatia in three agroecological regions: Pannonia, the mountain zone and the Mediterranean. Organic farming is still a relatively small and underdeveloped sector, but is growing fast from 12 ha certified production in 2000 to 1 500 ha in 2003. There are currently 110 registered producers working to national standards with a certification system and eco-label (Ecological Product of Croatia).

There is good political support for organic farming with an Organic Production Act and associated regulations, support payments (3 000 kn/ha for organic crop production and 30% extra payment on conventional livestock subsidy) and a dedicated unit in the Ministry of Agriculture. There are also a number of NGOs supporting organic farmers. Support for further development of the organic farming sector is coming from an FAO project *Diversified Value-added Production and Certification in Environment Friendly Farming Systems*. The specific objectives of the project are to:

- to develop a strategy to support organic and special quality agricultural production
- to build national capacities in specific certification, production and research requirements
- to improve the certification systems

Integrated crop production is less well-developed than organic farming due to the lack of appropriate knowledge, organisations and legal definitions.

Sever Eco-Farm: Technical Visit

The workshop concluded with a visit to the Sever Eco-farm, a pioneering organic farm close to Zagreb that is managed by Mr Mario Sever and his family. The visit provided an excellent opportunity to consider agricultural pollution control in a wider context than simply the rationalisation/improved management of agro-chemical inputs.

The Sever Eco-farm consists of a total of 55 ha, including a rotation of 10 ha of vegetables, 30 ha of arable crops (wheat, sunflower etc.) and approximately 15 ha of fertility-building grass-clover pastures. Manure applied on the farm is currently imported from neighbouring farms, but there is a rapidly expanding poultry enterprise of over 1,500 laying hens. All produce is certified according to Croatian organic standards.

Most fresh produce from the farm is currently sold through 3 market stalls in central Zagreb, plus a number of other direct marketing outlets. Some vegetables and cereals are also processed to add value.

Results from Working Groups

Session 1: Priorities for Policy Development

EU Accession Countries - Czech Republic, Slovakia, Hungary and Slovenia

Facilitator: **Merit Mikk**

How did the presentations given and draft reports distributed reflect your situation?

- Agree with general results of the studies but would like to see more details in the report
- Would like to see the impact of findings on water
- Would like to see the overview of policy instruments used per country (incl. Germany and Austria)
- The consultants should be careful using national averages as the regional differences are significant
- It would be useful to include information about water quality development, not only fertiliser/pesticide consumption and to link these data
- It is good idea to link economical and environmental concerns (information, extension)
- There should be clarification somewhere in the report on use of the terms: GFP, GAP, BAP, etc.
- In some cases (e.g. SI) there might be some better data sources available, some data on nutrient balances are questionable.

Which are the policy instruments that should be further developed in your region?

- Economic incentives are designed (CZ, SI, SK, HU), but there is a lack of budget and low implementation capacity. The question is - how to implement these instruments quickly?
- The compliance checking of regulatory instruments is very problematic (CZ, SI, SK)
- How to improve the enforcement of all instruments? CZ
- Awareness raising (education, information, discussions, etc.) is very important (SK), but remember that this should target all stakeholders, not only farmers!
- Big issue is how to combine the various EU concepts of GFP, GAP etc in order to make them more simple and understandable to farmers and other stakeholders (CZ)

General Conclusion

All countries representatives mentioned that there are:

- enough regulatory mechanisms, but enforcement (esp. control) mechanisms are weak
- enough economic instruments, but implementation capacity is low and there is not sufficient budget

EU Pre-accession Countries - Romania, Bulgaria and Croatia

Facilitator: **Alexander Zinke**

How did the presentations given and draft reports distributed reflect your situation?

The participants basically agreed with the results presented. There were a number of items for which improvements were suggested and agreed in the WG:

1. Pesticides

1.1. Items of the *Pesticides Report* to be **improved/complemented**:

- Monitoring and control of pesticide use should be strengthened.
- Report recommendation 4.5.: Support of marketing for organic products should become a separate point.
- Point 4.4 Develop On-farm "Quality Assurance Schemes": It should be clarified that this refers to conventional farming and not to organic farming.
- Point 1.1 Pesticide ban: It was suggested to fix a deadline for the Atrazine ban (a maximum of 5 years for its phase out).

1.2. Items of the *Pesticides Report* to be **added**

- Research should be added as a new point.
- Need of Agricultural Knowledge Information Systems (such as AKIS in Romania) in order to link science, education (esp. the extension services) and farmers.
- Extension services need to be educated (a certification scheme was suggested as a policy instrument)
- Strengthen the links between government, extension services, research and education institutions
- Strengthen the role of organic farming associations (make them important partners and stakeholders)

2. Fertilisers

2.1. Items of the *Fertiliser Report recommendations* to be **improved/complemented**

- Point 2.1.: Strengthen the farmers competence on being able to assess their nutrient balance
- Point 2.4.: Secure a high quality of the extension services (e.g. via certification); include a training on fertiliser use.

2.2. Items of the *Fertiliser Report recommendations* to be **added**

- Point 1.2.: Promote that manure is a valuable resource and that there are options for using and trading manure (e.g. marketing of its application in crop production, for biogas production ...)
- Point 2.5.: Provide farmers with comprehensive soil analyses and related recommendations on which are the best agricultural activities on their lands.
- Point 2.6.: Promote better government – NGO co-operation on the development, promotion and implementation of GAP in their countries and river basins. Also via an Agricultural Knowledge Information System such as AKIS..

2.3. Items of the *Policy Report recommendations* to be **improved/completed**

- The recommendation for all countries: *to design and implement documents falling into cross-compliance concept (FPP etc.)* needs to be clarified, the term *document* is unclear.

3. General

- Link the new agricultural policy to other existing legislation (e.g. other conventions, national law) in order to better justify the overall needs and benefits of its introduction and execution.

EU Non-accession Countries - Bosnia & Herzegovina, Serbia & Montenegro, Moldova and Ukraine

Facilitator: **Holger Afflerbach**

How did the presentations given and draft reports distributed reflect your situation?

Presentations were generally accepted as an accurate reflection of the situation in the different countries in this group. Additional key issues raised by the country representatives were as follows:

Bosnia & Herzegovina

- Ownership of land is highly fragmented
- Political structure is very complex with central government plus total of 12 regional governments each with ministries of agriculture and environment. Agricultural pollution is not a high priority and there are no clear mechanisms for communicating information on the risks of agricultural pollution or the development of new policy-making approaches
- There is no rural development policy – this is a key issue since agricultural pollution is closely linked to rural development
- There are no funds for research into the causes and control of agricultural pollution
- There is no framework for the development and implementation of agricultural pollution control – there is urgent need for institutional reform and capacity building
- Access to information on the causes of agricultural pollution and the practical measures and policy options for controlling pollution is very poor
- Co-ordination of donors needs to be improved is required to make best use of the limited resources available

Moldova

- Regulatory structures are generally good, but capacity to implement legislation is poor
- Highly fragmented patterns of landownership are a major obstacle to introducing good practice
- Much greater co-ordination of donors is required to make best use of the limited resources available
- Good potential for organic farming, but no legislation or institutional structure to implement it

Serbia & Montenegro

- Co-operation between the ministries responsible for agriculture and water needs to be improved
- There are many small (approx. 3ha), part-time farms – these need policies designed specifically for them
- The dissemination of information to farmers is critically important
- Need to involve NGOs more effectively
- There is good potential for development of new and more appropriate policies for agricultural pollution control (even some small-scale economic incentives), but greater access to information is needed to build the knowledge and capacity of policy-makers

Ukraine

- Access to information on the causes of agricultural pollution, plus the practical measures and policy options for controlling agricultural pollution is very poor and needs to be improved – in particular, information on what lessons can be learnt from other countries

- Need to develop appropriate "channels of communication" – awareness-raising activities and information packages need to be appropriate to different levels of stakeholder from farmers to policy-makers
- Need to involve more active NGOs as part of the driving force for change

Session 2: Promoting the Concept of BAP For Agricultural Pollution Control

EU Accession Countries - Czech Republic, Slovakia, Hungary and Slovenia

Facilitator: **Merit Mikk**

Do you agree with the proposed concept of Best Agricultural Practice (BAP)?

All participants of the group (including the German and Austrian participants) agreed in general with the BAP concept proposed, but had following remarks:

- it would be good to include few examples from the EU countries on success stories and failures of using different information tools in order to communicate the message of GFP (or GAP) to farmers (like the UK example described by M. Redman)
- explain more clearly terms used in the concept paper (e.g. small point pollution sources)
- better explanation of the connection of BAP (red, blue, green box) to existing mechanisms in EU is needed
- it should be explained that same management practices are belonging in different countries to different boxes (illustrated with some examples)
- BAP is useful tool for preparation of DRB management plans
- concept should be introduced to the officials in Brussels as they are mostly thinking only in red and green box

What are the priority actions to get BAP implemented in your country?

SK representatives of the WG proposed the following priority actions:

- Information flow (information campaign to all stakeholder groups, not just to farmers through media, publications (different for different stakeholder groups) and training
- Enforcement of legislation (capacity building and strengthening of inspection facilities, additional legislation where needed)

CZ representatives of the WG proposed the following activities:

- Study on costs of the stricter limits
- Information campaign for the farmers (including legislative requirements, potential of blue and green zone)
- Finding more finances for implementing already proposed measures (green box), but also for capacity building of the inspection system

HU representatives of the WG proposed:

- Research projects needed on non-point source pollution in order to find out the priority actions to be taken
- Establishment of information exchange system between accession countries (RDP, GFP, BAP)

SI representatives of the WG proposed:

- Capacity building of the extension services on BAP concept to get the message rapidly to the farmers

- Land consolidation process (very time-consuming but needed for implementation of BAP)

What you are expecting from the phase 2?

There was too little time to cover this question properly.

The countries in this Working Group will not be eligible for UNDP/GEF assistance for pilot projects, but all participants still emphasised the need for some concrete action in Phase 2 to support their information needs – some form of information exchange network between the 4 accession countries would be very valuable.

EU Pre-accession Countries - Romania, Bulgaria and Croatia

Facilitator: **Alexander Zinke**

How does the draft concept of Best Agricultural Practice (BAP) relate to your situation?

The participants basically agreed with the **draft Concept** presented. There were a few items for which improvements were suggested and agreed:

- Specify the concept to different farming situations within the DRB regions and countries.
  - Develop a classification scheme of farms by type (education and age of farmer, size, production, organisation)
  - Develop a zonation of specific (e.g. sensitive) region
- The farm classification and zonation should also be used for a better targetted promotion of BAP.
- Develop all 3 levels of environmental farm management (there is yet too little action on the lower = red/blue levels
  - Via law enforcement
  - Via SAPARD funds
- Strengthen the dialogue of farmers and farmer associations with local county agents for achieving BAP
- Establish and include in the BAP concept some economic minimum (blue zone) and maximum (green zone) levels of farm management (e.g. book-keeping, market orientation, subsidy application)
- Develop and implement environmental protection measures for vulnerable zones prone to ground- and surface water pollution
- Introduce an agro-environmental programme in Croatia.

EU Non-accession Countries - Bosnia & Herzegovina, Serbia & Montenegro, Moldova and Ukraine

Facilitator: **Holger Afflerbach**

How does the draft concept of Best Agricultural Practice (BAP) relate to your situation?

The concept of BAP was accepted, but for practical implementation it needs clear standards that can be easily understood and undertaken by farmers from the "bottom-up". The major issue in all countries is developing the appropriate pre-conditions for promoting BAP – notably:

- Existing laws on pollution control and the management of natural resources need to reformed
- Appropriate legislation is needed to encourage greater land consolidation and the creation of more viable farms with greater potential for improving agricultural practice. Greater co-operation between farmers is also needed to make better use of limited resources to improve farm technologies (e.g. more modern machinery)

- Access to information on the causes of agricultural pollution, plus the practical measures and policy options for controlling agricultural pollution is very poor and needs to be improved – in particular, information on what lessons can be learnt from other DRB countries
- As a critical first step education and training are needed at all levels from farmers and advisers to politicians and policy-makers
- More support for investment in basic manure handling facilities is needed, but the generation of necessary funds remains a problem
- Pilot projects are needed to demonstrate good agricultural practices for the reduction of water pollution by farmers – farmers need to see things for themselves

Conclusions and Recommendations from Workshop

The workshop successfully brought together a cross-section of policy-makers in agriculture and water quality from all 11 central and lower DRB countries to participate in discussion of the problems and potential practical solutions associated with agriculture and water pollution in the region.

The workshop was evaluated highly by participants with the majority considering that the workshop's objectives had been met – namely:

1. To develop understanding of EU policy developments regarding agricultural pollution and "good/best agricultural practice"
2. To present information collected on a) agrochemical use in the DRB and b) current status of agricultural pollution control policies
3. To introduce and discuss a draft concept of Best Agricultural Practice (BAP) for the DRB

The workshop also provided an excellent opportunity for the GFA Terra Systems/Avalon consultancy team to receive feedback on their work-to-date and to make relevant corrections/contributions to existing project outputs.

Of particular value were the two "break-out" sessions during the workshops during which the national representatives were divided into 3 working groups according to their country's status regarding EU accession (i.e. the principal driving force for policy reform in the DRB at present). This approach worked well, allowing the opportunity for discussion and feedback at a national level without the complications arising from the widely differing policy-making context currently created by further EU enlargement into the DRB.

Conclusions

1. The huge diversity of the 11 central and lower DRB countries must be taken into account when developing and promoting the concept of BAP in the region. Any concept of BAP for the region must therefore be flexible and adaptable – the concept promoted in the workshop is appropriate, but requires some further development and elaboration

2. In the lower DRB countries especially it is important to conditions the pre-conditions or "framework factors" for the successful promotion of BAP – in particular how to overcome the obstacles to BAP that arise from the fragmentation of land ownership, lack of financial resources, lack of institutional capacity, lack of basic business skills amongst farmers (e.g. keeping records), poor standards of education and training etc.

3. Representatives from all countries stressed:
   - the lack of information at national, regional and local level on the causes of agricultural pollution and the practical measures available to farmers for reducing the risk of pollution from their farming activities, and
   - the need to target awareness-raising and information at all stakeholders levels from farmers to policy-makers

4. Farmers are economically-motivated and it is important to link the promotion of more environmentally-friendly farming methods to economic benefits such as improvements in yield and savings in the cost of agrochemical inputs – the development of appropriate agricultural advisory messages is therefore essential, including well-written and appropriate advisory materials, demonstration plots/farms, training for advisors and other capacity building of agricultural extension services

5. There should be more emphasis upon a "farming systems" approach to agricultural pollution control rather than simply an "input reduction" approach – in other words, it is necessary to promote not only the reduced use of agrochemicals etc., but also the re-design of farming systems to make them more environmentally sustainable. A good example of this approach is the promotion of organic farming which involves much more than prohibiting the use of pesticides and mineral fertilisers to include changes in crop rotation, soil manure, the storage and management of manure etc.

6. Although it is not proposed to include the management of point source emissions from "agro-industrial units" in the concept of BAP, it is still important to promote BAP for these large livestock production units – particularly regarding the land application of manure and slurry (e.g. Farm Waste Management Plans)

Recommendations

1. Develop final BAP concept paper to include:
   - more examples of experiences of successes/failures from EU Member States
   - clearer explanation of some terms in the concept paper
   - examples of the application of BAP to different farming systems
   - better explanation of the connection between BAP and existing EU mechanisms
   - clear identification of the pre-conditions or "framework factors" for successful promotion of BAP

2. Ensure that conclusions from workshop are considered during the design of BAP pilot projects – access to information is a particularly important issue and in the context of the pilot projects also includes:
   - how to orientate and organise agricultural extension services to become actively involved in promoting BAP
   - how to promote the agricultural extension services to farmers

Annex 1: Final Workshop Programme

"Promoting Best Agricultural Practice in the Danube River Basin (DRB)"

Workshop Dates 6 – 7 October, 2003

Workshop Location Hrvatske Vode (Croatia Waters), Ulicia grada Vukovara 220, Zagreb

Organised by GFA Terra Systems/Avalon Consultants

Workshop Objectives

1. To develop basic understanding of the current EU policy context regarding agricultural pollution and the concept of "good/best agricultural practice"
2. To present background information on a) agrochemical use in the Danube River Basin countries, and b) the current state of agricultural pollution control policies
3. To introduce and discuss a draft concept of Best Agricultural Practice (BAP) for the control of agricultural pollution in the DRB - including the priorities for further policy development for promoting BAP

Sunday, 5 October 2003

Arrive in Zagreb – accommodation at Hotel International, Zagreb

Monday, 6 October

09:30	Arrival and Coffee
10:00	Welcome and Introduction to the Aims and Context of the Project and Workshop
10:15	Introduction from all participants
	SESSION 1: Setting the Scene (Chaired by: Alexander Zinke)
10:30	The Emerging Concept of "Good Farming Practice" in the Implementation of EU Policy and Legislation - *Dr Karlheinz Knickel, Institute for Rural Development Research, Frankfurt*
11:00	The Water Framework Directive and Agricultural Pollution Control in the DRB – *Yanka Kazakova, WWF Danube-Carpathian Programme, Sofia*
11:30	Questions
11:45	Coffee Break
12:00	Problems Associated with Pesticide and Fertiliser Use in the DRB - *Lars Neumeister/Mark Redman, GFA Terra Systems, Hamburg*
12:45	Questions
13:00	Buffet Lunch (local organic produce)
	SESSION 2: Policies for Agricultural Pollution Control (Chaired by: Karlheinz Knickel)
14:00	The Current State of Agricultural Pollution Control Policies in the DRB - *Jaroslav Prazan, GFA Terra Systems, Hamburg*
14:30	Policy Recommendations for Pesticide and Fertiliser Use - *Lars Neumeister/Mark Redman, GFA Terra Systems, Hamburg*
14:45	Questions and Briefing for Break-out Groups
15:00	*Break-out Groups* – Discussion of Priorities for Policy Development for Agricultural Pollution Control in the DRB
16:00	Coffee Break
16:15	*Break-out Groups* –prepare short group presentation
16:45	Feedback and presentations from break-out groups – conclusions and recommendations
17:30	Close

Tuesday, 7 October 2003	
08:45	Arrival and coffee
	SESSION 3: Best Agricultural Practice for the DRB (Chaired by: Natalia Pogohzeva)
09:00	A Draft Concept for Best Agricultural Practice (BAP) in the DRB - *Mark Redman, GFA Terra Systems, Hamburg*
09:30	Recommendation on Best Available Techniques for Agro-industrial Point Source Pollution – *Stanislav Juran, ICPDR Emissions Expert Group*
09:45	Questions and Briefing for Break-out Groups
10:00	*Break-out Groups* – Promoting the Concept of BAP for the Control of Agricultural Pollution in the DRB
11:00	Coffee Break
11:15	Feedback and presentations from break-out groups – conclusions and recommendations
	SESSION 4: Putting Principles into Practice
12:00	Integrated Production and Organic Farming in Croatia, *Zelijka Gudelj-Velaga, Ministry of Agriculture for Croatia, Zagreb*
12:30	Introduction to the Sever Eco-farm - *Mario Sever, organic farmer*
13:00	Buffet Lunch (local organic produce)
14:00	*Technical Visit* – Visit to the Sever Eco-farm, a pioneering organic farm near Zagreb for demonstration and discussion of the practical challenges and financial opportunities for introducing alternative farming systems in the DRB.
18:00	Evening meal with the Sever family
Wednesday, 8 October 2003	
Depart from Zagreb	

Annex 2: List of Participants

Name	Position	Organisation	Country	E-mail address
Water Policy Representatives				
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Invited Speakers				
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Ms. Yanka KAZAKOVA	Bulgarian Policy Officer	WWF Danube-Carpathian Programme	Bulgaria	kazakova@internet-bg.net

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Annex 3: Presentations from Keynote Speakers

The following presentations are included as accompanying PDF files:

a) The Emerging Concept of "Good Agricultural Practice" in the Implementation of EU Policy and Legislation - *Dr Karlheinz Knickel, Institute for Rural Development Research, Frankfurt*

b) The Water Framework Directive and Agricultural Pollution Control in the DRB - *Yanka Kazakova, WWF Danube-Carpathian Programme, Sofia*

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Main goals of EU Common Agricultural Policy (CAP)

- Since 1960s:
  - Sufficient supplies with food
  - Fair income & living conditions for farmers & their families
- Since end 1980s: Wider economic & social context of rural areas is becoming important
  - Integrated rural development
- Since beginning 1990s: Environmental dimension of agriculture

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Development of the CAP

- Agenda 2000 consolidates the changes introduced by the CAP reforms of 1988 & 1992

  Consumer concerns, environmental goals, international environmental agreements & the interests of many farmers point in the same direction
  - more product quality
  - environmentally friendly farming
  - regional markets / more value added in rural areas
  - more autonomy to regions to design programmes

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New societal demands

- CAP funding & the farm sector need to take account of the legitimate demands of society
- Agricultural activities should not pollute the environment, nor lead to severe erosion, nor destroy cultural landscape features valued particularly highly by society
  - Birds & Flora-Fauna-Habitat Directives
  - Nitrate Directive
  - Water Framework Directive

Integrating agricultural & environmental goals

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Frankfurt

Mechanism of integration

- Farmers should observe a minimum level of environmental practice *"as part-and-parcel of the support regimes"* (= cross-compliance)
- Any additional environmental service, beyond the basic level of good agricultural practice (GAP) & respecting environmental law, should be paid for by society (e.g. through AEP)

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Measures for integration

(1) AE measures promoting sustainable agriculture / low-input farming systems / organic agriculture / maintenance of semi-natural habitats

(2) Support for less-favoured areas (LFA)

(3) Compensation payments for farmers in areas with environmental restrictions

(4) Cross compliance: only support farmers who apply GAP - e.g. investment support, producer price compensation, LFA support, etc.

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.....

(5) Vocational training: prepare farmers for new production practices / a quality reorientation

(6) Investment support

- Better technology
- Increase storage capacity for organic manure
- Improve the processing & marketing of agricultural products from environment-friendly agriculture

(7) Information for consumers: eco-labelling

(8) Economic disincentives
- e.g. taxation of agri-chemicals

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Good Agricultural Practice (GAP)

- Based on the idea of property rights
- Relates to all aspects of the environment
  - use of agri-chemicals & pollution of soil / water / air
  - eutrophication & impacts on biodiversity
  - landscape structures & management
  - soil management & conservation
- Important in EU legislation / relevant to current & future CC
- Agri-Environmental Programmes (AEP) & Less Favoured Area (LFA) policies

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Ideas in the background

- Types & intensities of agricultural land use should
  - be compatible with environmental legislation
  - correspond with good management principles
- Providing real environmental benefits to society (public goods) ⇨

  Value for money EU: principle of cross compliance
- WTO considerations: connecting payments to farmers with environmental demands

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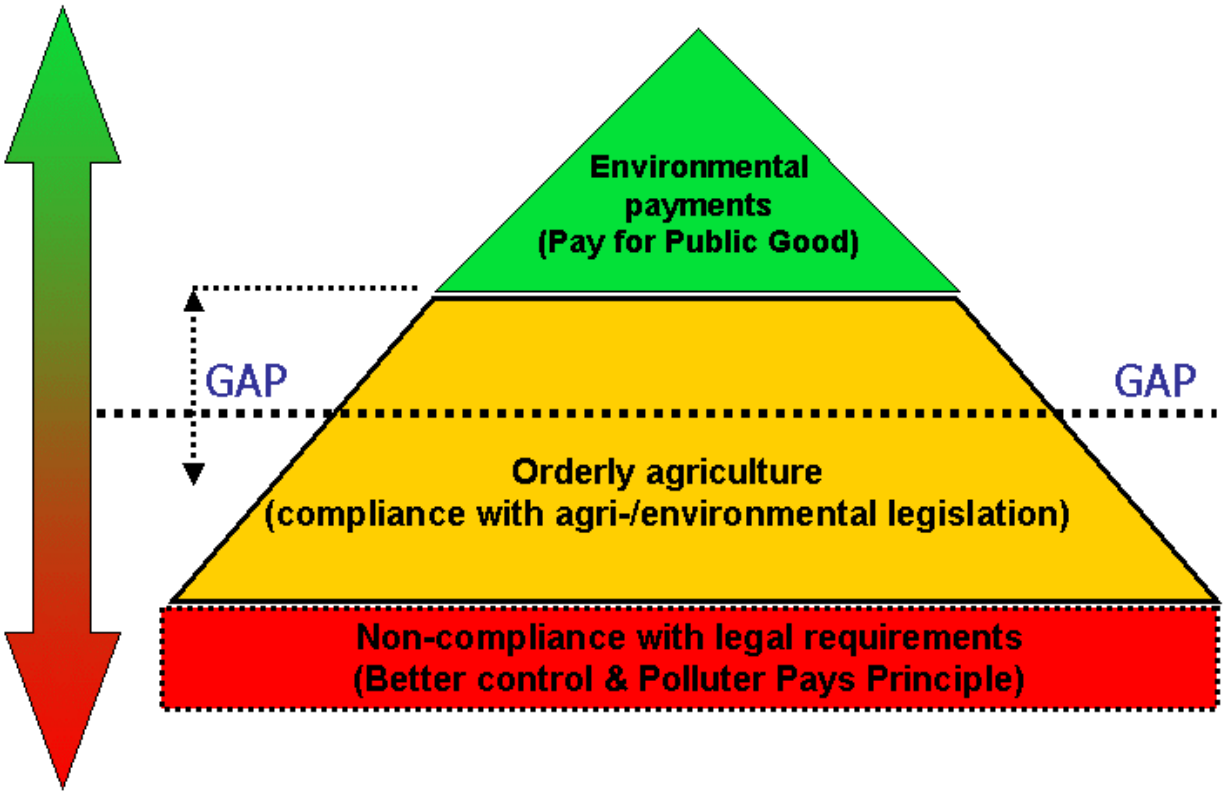
Basic concept

- Good Agricultural Practice (GAP) represents a baseline (red line) of environmental standards applying to all farmers
- Farmers expected to comply with GAP without any reward or inducement
- Above this line farmers become eligible for
  - incentives (voluntary measures) or
  - compensation (obligatory measures)

  in return for meeting society's preference for higher standards



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EU Rural Development Regulation (RDR 1257/1999)

- Article 23, paragraph 1 of the Regulation sets out a basic principle

  'Agri-environmental commitments shall involve more than the application of usual GAP'

- Compliance with this rule needs to be demonstrated & is subject to checking

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EU Implementing Regulation 445/2002

- Sets out more specific rules on the implementation of the RDR
- Article 29 defines 'usual Good Agricultural Practice' as the *"standard of farming which a reasonable farmer would follow in the region concerned"*
- Member States are required to specify 'verifiable standards' in their RD plans
- Standards *"shall entail compliance with general mandatory environmental requirements"* i.e. binding legislation

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General mandatory environmental requirements

- Environmental legislation relevant to agriculture
  - includes Community legislation
    e.g. Nitrates & Water Framework Directives
  - the measures taken to implement them at the national level
  - also includes other national agri-/environmental law which creates obligations applicable to farmers

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Defining GAP

- Concept allows for some flexibility in order to
  - match local conditions (varying natural / physical conditions)
  - allow for development over time (technological change)
- In any one region/country it may comprise:
  - mandatory environmental legislation (EU, national, .. local level)
  - other binding or semi-obligatory measures (such as formal codes of GAP)
  - further elements (e.g. standards promoted by extension services, relevant technical standards)

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Principle of subsidiarity

- Encourage decentralised decision-making & policy implementation: Division of responsibilities
- Recognition of different levels of action / intervention
- More flexibility at subordinate levels
- Consistent & good framework regulations at higher national / EU levels
- More precise definition of measures (design) & implementation (incl. control of compliance at farm level) at lower levels

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Some requirements for standards

- Standards must relate to environmental situation (relevance, specifity)
- Environmental authorities & NGOs ought to be involved in formulation
- Appropriate rules to be established & well-defined, operational indicators agreed upon to ensure the success of monitoring, control & evaluation
- Compliance with standards must be controllable without excessive effort (cost-efficiency)

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Some examples for standards

- Existence of buffer strips with appropriate vegetation
- Adequate storage capacity for slurry / manure
- Avoidance of overgrazing
- Appropriate standard of maintenance for pesticide application equipment
- Grassland use in river valleys with significant flood risk
- Grassland use on steeply sloping ground

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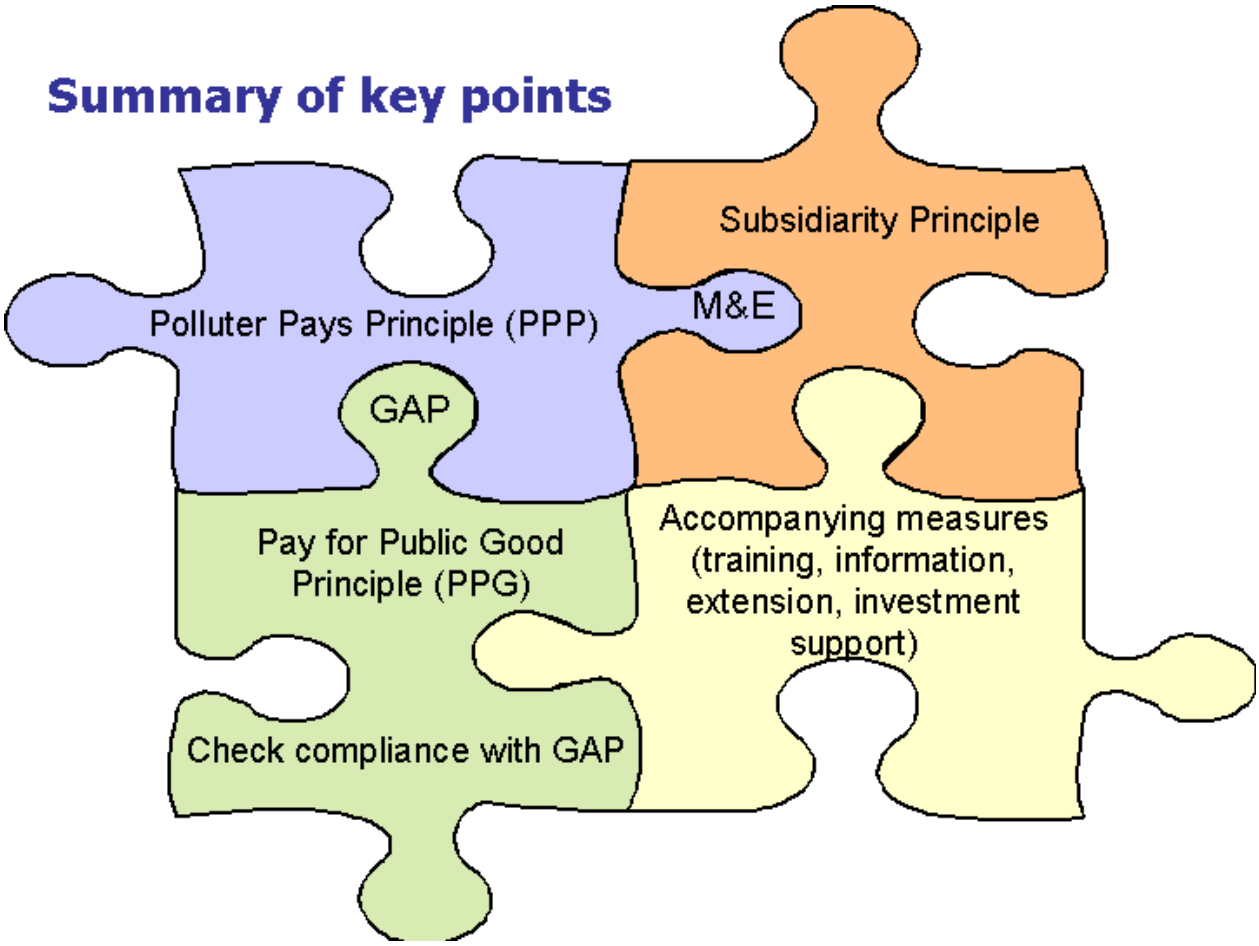
GAP & AEP

- Usual GAP is the standard which a reasonable farmer should follow in the country/region
- GAP needs to apply to a whole area of farm where an agri-environment agreement is in place
- Candidate countries have to notify a set of 'general, verifiable & manageable standards' prior to commencement of AE pilot schemes
- Competent national authorities needed to be able to check compliance with GAP relatively simply

Summary of key points



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The Water Framework Directive and Agriculture Pollution Control

Workshop "Promoting Best Agricultural Practices in the Danube River Basin (DRB)"

UNDP/GEF Danube Regional Project
6-7 October, 2003, Zagreb, Croatia

Yanka Kazakova, Policy Officer,
WWF Danube-Carpathian Programme

Structure

- Introduction
- WWF's commitment to WFD
- The WFD – objectives, …
- The WFD, IRBM and Agriculture
- Conclusions

WWF: One of the world's largest independent conservation organizations

- WWF's global mission is:

  "To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature"

- With almost five million supporters distributed throughout five continents, WWF has over 28 National Organizations, 24 Programme Offices and 4 Associates

WWF and the WFD

- WWF sees the Water Framework Directive (WFD) as **the best current tool to ensure rational, more "eco-efficient" use of water and wetlands across Europe**, in order to conserve and restore the functions and integrity of freshwater ecosystems, both in terms of its "result" ("good status") and "process" obligations (IRBM – integrated river basin management)

- As a result, many WWF activities are aimed at facilitating WFD adoption, implementation and achievement of its objectives

Why is WWF so committed to WFD?

- It is changing the way river basins are managed;
- It is changing the way that policies are integrated;
- It is changing the way Europe manages its environment;
- It is changing the way funds are being allocated;
- It is changing the way NGOs are involved in decision-making;

The EU Water Framework Directive

- New EU water law after end 2000. Blueprint for water management in Europe (and elsewhere) for next 20 years
- AMBITIOUS OBJECTIVES: Obliges European countries to prevent further deterioration, and protect, enhance and restore all waters aiming at achieving "good ecological and chemical status" by 2015, mainly through the implementation of Integrated River Basin Management (IRBM)
- Mandatory application in EU-15 and 12 EU-Accession. Non-mandatory application in Switzerland, Norway, parts of Russia, all ICPDR member countries, etc.

The WFD, continued..(1)

- The WFD sets a clear environmental target of **'good water status'** for all ground and surface waters in the EU and provides a framework for the coordinated implementation of all existing water legislation.
- The WFD **maintains existing commitments** of Member States under the *Nitrates Directive* (91/676/EEC) and Urban Waste Water Treatment Directive (91/271/EEC).
- **Integrated river basin management** is the framework within which measures for achieving 'good status' are to be implemented. The countries must ensure that the necessary technical and institutional infrastructure is in place (including spatial definition of pressures and impacts, e.g. *agricultural*).

The WFD, continued..(2)

- A **river basin management plan** must be developed, with transboundary basins requiring joint management between two or more countries. This provides for the spatial integration of measures in favour of sustainable water management (*i.e.BAP*).
- The precise measures to be taken within a given river basin will vary widely according to natural, socio-economic and cultural factors. The Directive foresees that **the choice of measures will be taken according to what is most appropriate at the basin level** (in turn reflecting what is appropriate for a given region or country).

The WFD, continued..(3)

- **Water pricing** is another central element of the Directive, acting as an incentive for the sustainable use of water resources and thereby contributing to achieving environmental objectives and helping to reduce unnecessary consumption (*over-use of water for irrigation);*

- **Public participation** is a fundamental component of the WFD, with a recognition that solutions to current water problems need to be 'bottom-up' as well as 'top-down' (*incl. farmer's associations, water users associations, etc.*).

WFD: Integrated river basin management

The integrated river basin management (IRBM) plans under the WFD will provide a sound basis for spatial planning, development and implementation of components of the CAP and Structural/ Cohesion Funds.

Cross-cutting principles for effective IRBM:

- *Integration;*
- *Scale;*
- *Timing;*
- *Participation;*
- *Capacity building*;

IRBM Principle 1 - Integration

- Present situation:
  - Plethora of organisations with an impact on water
  - Plethora of plans and strategies
- Integration at the operational level is required:
  - Within water management sector
  - Between water management and other sectors *(farming)*
  - Integrating management of ground and surface waters
- Integrating WFD with other legislation, policy and financial instruments at the EU level

IRBM Principle 2 - Scale

- For a successful WFD implementation different things need to happen at different scales *(at river basin scale, at national scale or European scale)*
- Tailor approach to the location (no transferability of approaches given varying size of basins)
- Coordinate "top-down" and "bottom-up" approaches to ensure that they achieve, in combination, the "good ecological status" objective

IRBM Principle 3 – Timing

- Better to begin implementation early and imperfectly than to wait for 'perfect conditions' *(e.g all analysis ready)*
- Use existing structures, processes and tools wherever possible, but making sure they are suitable *(CGAP – Nitrate Dir., AE measures)*
- Develop and implement public participation and stakeholder involvement from the beginning
- Consider timing of related activities *(e.g. land use planning)* as well

IRBM Principle 4 – Participation

- Interactive process that relies on building trust and confidence and allow stakeholders to have a real involvement and influence -> more than information & consultation
- Benefits:
  - Ownership of processes and results
  - Increased expertise
  - Reduced costs
  - Minimisation of conflicts
- It needs:
  - Early provision of transparent information and genuine opportunities for participation
  - Adaptation to appropriate scale and target group(s)
  - Careful management of expectations
  - To be supported by adequate human & financial resources

IRBM Principle 5 – Capacity Building

- Main elements:
  - Raise public awareness,
  - Transfer knowledge *(e.g. exchange of experiences between river basin managers)*
  - Technical training

- Need to invest human and financial resources

- Need to build capacity (human & money) among all sectors:
  - Public & NGOs
  - Private sector
  - Government , planners, water managers & administrators
  - Technical experts

Economic instruments for the WFD

- Water pricing;

- Financial incentives, *i.e. agri-environmental payments*;

- Eco-conditionality for other support, *i.e. cross-compliance*;

- Water trading and transfer of water rights/permits, *i.e. for irrigation;*

- Others…

At the end:

Without sustainable farming

and rural development policies

effective implementation of environmental policies is impossible

Annex 4: Summary of Inventory of Agricultural Pesticide Use

Inventory of Agricultural Pesticide Use in the Central and Lower Danube River Countries: SUMMARY REPORT

Policies for the Control of Agricultural Point and Non-point Sources of Pollution: Output 1.2

September, 2003

Prepared by: Lars Neumeister, GFA Terra Systems in co-operation with Avalon

Introduction

Pesticides are used to control a wide range of agricultural pests, diseases and weeds. Despite the fact that they are among the most toxic substances released into the environment, they have become widely accepted by many farmers as an integral part of modern agriculture. Consequently their use is one of the most significant factors contributing to the high levels of agricultural productivity observed in many western European countries where most cultivated crops receive at least one, and usually many more, pesticide applications per year.

The development and widespread use of pesticides has largely taken place over the last 50 years with a succession of more sophisticated and effective pesticide products being introduced. Each of these pesticide products contains a number of constituents – including the **active ingredient** (ai) (or mixture of active ingredients) which is specifically intended to kill those pests, diseases or weeds that are considered unwanted in modern agricultural production.

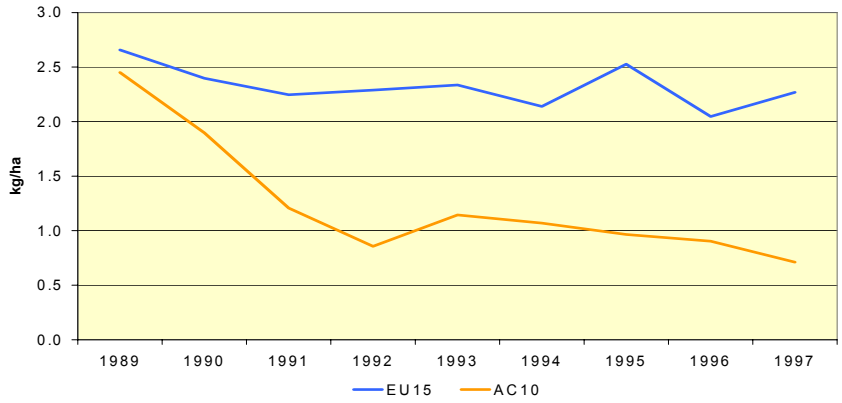
Pesticides contribute to higher yields, improved crop quality and higher economic returns for farmers. However, data on their use by farmers is far from comprehensive and accurate data on their consumption is frequently missing from many European countries – this makes the assessment of trends in their use rather difficult, especially since the products used by farmers vary enormously between countries/regions according to seasonal, climatic, agronomic and other factors.

Despite this, it is very clear that the use of pesticides has declined significantly in the countries of central and eastern Europe (CEE) since the political changes and sector reforms of the early 1990s disrupted the process of modernisation, specialisation and intensification of agricultural production that was characteristic of the centrally-planned economies in the region.

Reliable data on pesticide use in the CEE region are not available for the decades leading up to 1990. However, data from the FAOSTAT database show a strong decline in pesticide use in the CEE countries to about 40% of 1989 levels compared to a relatively small decrease in EU Member States during the same period (Figure 1).

There are indications, however, that the use of pesticides in the CEE region is increasing again with concerns especially that enlargement of the EU will drive a trend towards the renewed intensification of crop production, particularly in the more productive regions of central Europe. At the same, there are many factors – including the risk of water pollution and the impact upon aquatic ecosystems – that are forcing much of European agriculture to rethink pesticide use, as well as many opportunities to promote new management approaches to pesticide use by farmers and policy-makers.

Figure 1: Pesticide Consumption in CEE countries and the EU15[1]



[1] The graph expresses mean consumption of pesticides (active ingredients classed as insecticides, herbicides, fungicides and others) per unit area agricultural land. Data from the FAOSTAT database of the UN Food and Agriculture Organisation

Aims of the Report and Approach Taken

The aim of this report is to present an inventory of major pesticide use in the central and lower Danube River Basin (DRB) countries, together with descriptions of observed misuse, potential impact upon the environment and potential for reduction.

The approach taken has been to focus upon so-called **priority pesticides** for the DRB. Studies of the water quality of the Danube River have found a number of polluting substances that regularly occur in the aquatic environment of the river. Some of these substances are of special concern for environmental and/or human health reasons and a list of "priority chemicals for the Danube River" has been prepared. According to Article 7 of the Danube River Protection Convention, which regulates emission limitations and water quality objectives and criteria, the discharge of hazardous substances from point and non-point sources shall be prevented or considerably reduced.

Annex II defines such hazardous substances and lists under Part 2 A (d) plant protection agents, pesticides and chemicals used for the preservation of wood, cellulose, paper, hides and textiles etc. Under Part 2 B of Annex II a number 40 single hazardous substances is listed. In 2001, substances listed in Annex X of the European Water Framework Directive 2000/60/EEC were taken into account in revising the ICPDR list of priority substances. Altogether, the new list contains 41 single substances out of which 24 chemicals, which are used as pesticide **active ingredients** and 5 chemicals, which are used as **inert ingredients**.[2]

Summary Table 1 lists the 29 priority chemicals used in pesticide products and their regulatory status globally and in the European Union. The table shows that most substances, except the inorganic compounds are already regulated by international conventions or the European Union – including:

POPs Convention – this aims at the elimination or restriction of persistent organic pollutant (POPs), while the PIC (prior informed consent) convention ensures that countries importing certain chemical are informed prior to the import, and that information about the hazards of the particular chemicals is disseminated.

EU Water Framework Directive No. 2000/60 - requires that measurements regarding dangerous priority substances aim at the phasing-out of these substances within 20 years after the adoption of measurements.

EU Authorisation under Directives No. 91/414 and 79/117- only 2 of the Danube priority pesticides are fully registered in the European Union and listed on Annex I of Council Directive 91/414/EC. For 3 of the priority pesticides, registration will expire or is already expired and 7 are still in the re-authorisation process. According to Directive 79/117 use of two of the priority pesticides is banned in the EU.

Methodology

Due to the limited availability of data sources on pesticide use in the DRB, national experts in each of the central and lower DRB countries under study were asked to undertake a survey of:

1. available data on the **amount** of these pesticides applied in DRB countries and **how** they are used (e.g. what crops are they applied to, number of applications etc.)
2. available information on **bad practice** by farmers and others regarding the use of these pesticides

The experts mainly submitted data based upon sales data and on the recommendations from the pesticide product registration. Actual use data by location, crop and active ingredient were generally not available and could not be submitted. Therefore the figures presented in this report mainly relate to general estimations of national usage of the priority pesticides.

Detailed information on registered products and their usage by country is located in the Annexes.

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[2] 'Inert' ingredient: these are substances which can enhance the efficiency of the active substance, make a product more degradable or easier to use.

Summary Table 1: Priority Pesticides in the Danube River Basin

				International Conventions		Status EU Water Frame Work Directive 2000/60		Status EU Directive 91/414 and 79/117
No.	**Ingredient**	**CAS Number**	**Use type**	**PIC**	**POP**	**Priority**	**Priority Dangerous**	
	Active Ingredients							
1	2,4-D	94-75-7	Herbicide					Annex I
2	Alachlor	15972-60-8	Herbicide			Yes		pending
3	Aldrin	309-00-2	Insecticide	Yes	Yes			banned
4	Atrazine	1912-24-9	Herbicide				Yes	pending
	Copper compounds	7440-50-8	Fungicide					
5	Copper carbonate, basic	1184-64-1	Fungicide					Notified
6	Copper hydroxide	20427-59-2	Fungicide					Notified
7	Copper oxychloride	1332-40-7	Fungicide					Notified
8	Copper sulfate (basic)	1344-73-6	Fungicide, Algaecide					not listed
9	Malachite (copper equivalent 57%)	1319-53-5	Fungicide					not listed
10	Chlorfenvinphos	470-90-6	Insecticide				Yes	out 7/03
11	Chlorpyrifos	2921-88-2	Insecticide				Yes	pending
12	DDT	50-29-3	Insecticide	Yes	Yes			banned
13	Diuron	330-54-1	Herbicide				Yes	Dossier
14	Endosulfan	115-29-7	Insecticide				Yes	pending
15	Endosulfan - alpha	959-98-8	Insecticide				Yes	not listed
16	Ethylene dichloride	107-06-2	Fumigant, Insecticide	Yes		Yes		not listed
	Hexachlorocyclohexanes							
17	Lindane (gamma-HCH)	58-89-9	Insecticide	Yes		Yes		out 6/02
18	delta-HCH	608-73-1	Insecticide	Yes			Yes	not listed
19	Isoproturon	34123-59-6	Herbicide				Yes	Annex I
20	Malathion	121-75-5	Insecticide					Dossier
21	PCP	87-86-5	Wood Preservative, Microbiocide,	Yes		Yes		out 7/03
22	Simazine	122-34-9	Herbicide				Yes	pending
	Zinc compounds							
23	Zinc sulphide	7440-66-6	Herbicide					not listed
24	Zinc phosphide	1314-84-7	Rodenticide					not listed
	Inert Ingredients							
1	1,1,1-trichloroethane	71-55-6	Solvent					not listed
2	Chloroform, Trichloromethane	67-66-3	Solvent, Fumigant			Yes		not listed
3	Lead	7439-92-1	Inert				Yes	not listed
4	Methylene chloride	75-09-2	Solvent			Yes		not listed
5	Trichloro ethylene	79-01-6	Inert					not listed

Regulation of Priority Pesticides in the Central and Lower DRB Countries

Summary Table 2 shows that only 3 priority pesticides are authorised for use in all of the DRB countries under study, while 7 priority pesticides are not authorised in any of the countries. There are also differences between the countries. The Republic of Srpska authorised 15, Romania, Serbia & Montenegro and Slovakia 14 priority pesticides, while Bulgaria and Moldova authorised 8 priority pesticides and the Ukraine only 6.

In some countries there are certain restrictions upon specific pesticide products. For example, in Croatia it is not allowed to apply Alachlor with a knapsack sprayer or a hand sprayer. It is also not allowed to use Alachlor on light soils after the maize has emerged. Use of Atrazine is limited to 1,5 kg ai/ha in humid and 1 kg ai/ha in arid areas. Endosulfan cannot be used in oil-seed rape and forestry. Use of Simazine is permitted only in maize monoculture. Trifluralin use is not permitted in soya bean and sunflower.

Summary Table 2: Authorisation Status of Priority Pesticides in the 11 Danube Countries

	BH												
Active Ingredients	FedBH	RS	BG	HR	CZ	HU	MD	RO	YU	SK	SL	UA	No.
2,4-D	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	**12**
Copper sulphate (basic)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	**12**
Trifluralin	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	**12**
Alachlor	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	**11**
Copper hydroxide	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	**11**
Copper oxychloride	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	**11**
Chlorpyrifos	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	**11**
Atrazine	N	Y	Y	R	Y	Y	Y	Y	Y	Y	B	N	**9**
Malathion	N	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	**9**
Isoproturon	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	**9**
Endosulfan	Y	Y	N	R	Y[3]	Y	N	Y	Y	Y	Y	N	**9**
Simazine	N	Y	N	R	Y[4]	N	N	Y	Y	Y	Y	N	**6**
Zinc phosphide	N	Y	N	N	Y	Y	N	N	Y	Y	Y	N	**6**
Diuron	Y	N	N	N	N	Y	N	Y	N	N	N	N	**3**
Lindane (gamma-HCH)	N	Y	N	N	N	N	N	Y	N	N	B	N	**2**
Chlorfenvinphos	Y	Y	N	N	N	N	N	N	N	N	N	N	**2**
Malachite (copper equivalent 57%)	N	N	N	N	N	N	N	N	N	Y	N	N	**1**
Copper carbonate, basic	N	N	N	N	N	N	N	N	Y	N	N	N	**1**
Aldrin	B	B	B	B	B	B	B	B	B	B	B	B	**0**
DDT	B	B	B	B	B	B	B	B	B	B	B	B	**0**
alpha-endosulfan	N	N	N	N	N	N	N	N	N	N	N	N	**0**
Ethylene dichloride	N	N	N	N	N	N	N	N	N	N	N	N	**0**
delta-HCH	N	N	N	N	N	N	N	N	N	N	B	N	**0**
PCP (pentachlorophenol)	N	N	N	N	N	N	N	N	N	N	N	N	**0**
Zinc sulphide	N	N	N	N	N	N	N	N	N	N	N	N	**0**
Number authorised	**10**	**15**	**8**	**12**	**12**	**13**	**8**	**14**	**14**	**14**	**12**	**6**	

Y = Authorised; N = Not authorised; B = Banned; R = Restricted

[3] Endosulfan is authorised, but there is no product containing Endosulfan registered.

[4] Simazine is authorised, but there is no product containing Simazine registered.

Use of Priority Pesticides in the Central and Lower DRB Countries

Information on the amount and identity of pesticides applied, at a particular location, on a certain date can be enormously useful in the protection of human and environmental health and in pest management. Accurate information on pesticide use can help provide better risk assessments and illuminate pest management practices that are particularly problematic so they may be targeted for the development of alternatives.

There is however little available information about the details of their distribution and use patterns in the central and lower DRB countries. From the 11 countries under study, only three countries maintain pesticide use/sales tracking systems based upon retail sales:

Hungary - collects twice a year sales data from wholesalers and local distributors. These have to submit data on the sales in kg as well as on the monetary amount on the basis individual formulated pesticide products. Sales data are publicly available in an aggregated format.

Czech Republic - all professional pesticide users have to keep spray records for 3 years. Farms larger than 10ha are required to submit summaries to the Department of Information. Farmers report on amounts applied by formulated product, crop and geographical region. Usage data are publicly available by crop and amount active ingredient. Data on pest and disease infestations are published as well. Pesticide sales data are also collected by the Czech Crop Protection Association.

Slovakia - started a pesticide sales reporting system in 1999. All traders are required to report annually sales data: manufacturer, importer, distributors and retailers. They are required to report name and amounts of formulated products for agricultural and for non-agricultural pesticides. Sales data are publicly available by amounts active ingredient, chemical class, use type and by postal code[5].

All farmers have to keep detailed records of their pesticide use and are required to submit summaries Central Control and Testing Institute of Agriculture.

Due to the relatively few pesticide use reporting systems that exist in the central and lower DRB countries, the GFA national experts were asked to provide (where available) **national** usage data for 2001-2002 for the priority pesticides. National data was submitted for 8 countries and is summarised in Table 3 – data was not available from Slovakia for this period.

The table shows that the reported total use of priority pesticides is the highest in Hungary and the Czech Republic - which is probably due to the fact that these two countries have comprehensive pesticide use tracking systems. In Hungary reported use is 10 times higher than in the Czech Republic, with copper as the most widely used pesticide. This is probably due to the fact that Hungary cultivates approximately 99.000 of vineyards plus a large area with fruits and vegetables, while the Czech Republic only cultivates approximately 11.000 ha grapes. Copper is used globally in large amounts in vineyards and orchards to control fungus and is approved as a pesticide in organic agriculture according to EU regulations.

The summary table also indicates that copper compounds are currently the most commonly used priority pesticides across all the DRB countries under study, followed by Atrazine, 2,4-D and Trifluralin.

The pesticide usage data submitted by the national experts are only estimations since they are based upon sales data (except Czech data) and often neglect trade. In three countries (Ukraine, Slovakia, Bulgaria) uncontrolled trade into the country was reported. Furthermore, the collected data only presents a picture of pesticide use at a national use – it is not possible to estimate pesticide use at a catchment level without significant extra survey work.

[5] Communication with Martin Hajas (Central Control and Testing Institute of Agriculture) and Jozef Kotleba (Ministry of Agriculture)

Summary Table 3: Use of Priority Pesticides in 8 DRB Countries (2001-2002) expressed as tonnes active ingredient (except Slovenia – formulated product)

	BH									
	Fed BH	**RS**	**HR**	**CZ**	**HU**	**MD**	**YU**	**SL***	**UA**	**Total****
	2002	**2001**	**2001**	**2002**	**2001**	**2002**	**2002**	**2001**	**2001**	
Copper sulphate	14,9	4,2		47,3	10.093	1.129	7,0	12,6		**11.295,4**
Atrazine	0,8	73,0	406,0	144,9	519,6		114,9			**1.259,2**
Copper oxychloride		4,0		128,8	450,8	45,2	162,5	12,2		**791,3**
2,4-D	24,0	5,8	120,0	83,1	407,7	39,8	0,0	20,7	26,8	**707,2**
Trifluralin	0,8	2,2		100,0	111,3	3,6	96,0	2,5		**313,9**
Copper hydroxide	2,0	1,0		36,7	109,6	21,0	10,0	83,2		**180,3**
Endosulfan					82,1			2,0		**82,1**
Chlorpyrifos	13,0			111,0	48,4	7,6		1,7		**180**
Diuron					20,9					**20,9**
Alachlor		4,8	37,0	255,1	12,5					**309,4**
Malathion		3,1			8,6	4,5	123,6		14,8	**154,6**
Isoproturon				130,0	2,5			67,0		**132,5**
Zinc phosphide				3,4	2,0					**5,4**
2,4-D EHE				5,9						**5,9**
Lindane		0,7								**0,7**
Simazine							10,0	2,4		**10**
Total	**55,5**	**98,9**	**563,0**	**1.046**	**11.869**	**1.251**	**524,0**	**204,2**	**41,6**	**15.449**

* data for Slovenia is presented as kg formulated product
** total is for active ingredient only (tonnes) and therefore excludes Slovenia

As part of the inventory data was also collected on the main crops that pesticides are applied to; typical application rates; number of applications per year, and; the percentage of crops that are treated.

As might be expected, it is clear from this data that a high percentage of crops in the DRB countries do not receive any pesticide applications at all. However, in certain areas and on certain crops pesticides are being used. Furthermore, where pesticides are being used:

a) the priority pesticides are high use pesticides, accounting in some countries for over 20% of total pesticide use
b) the use of priority pesticides is associated with specific crops:
   - Atrazine is mostly used in maize
   - Alachor in maize, rape seed and sunflower,
   - Copper compounds in vineyards, orchards and in vegetable including potatoes,
   - 2,4-D is used in mostly in cereals,
   - the insecticides Chlorpyrifos, Malathion and Endosulfan are used in orchards, vineyards, rape seed, alfalfa and vegetables
c) the intensity of use in treated areas can be higher than commonly found in western European countries

Since many soils in the Danube catchment area, particular those closer to rivers, are very good for intensified crop production it seems likely that these observations at a national level are all directly relevant to the DRB catchment and that pesticide use on cultivated soils in the catchment will most likely be higher than national averages reported.

Problems with Pesticide Use in the Central and Lower DRB Countries

Although pesticide use is currently relatively low in the DRB countries (compared for example to the EU Member States) it is important not to be complacent about the risks of pesticide pollution since:

1. Priority pesticides, as well as other pesticides, are frequently detected in surface and ground water in the DRB catchment area and pose a serious hazard to the environment and human health
2. Seven priority pesticides are not authorised in the Danube countries, some of them continue to be hazardous due to old stockpiles and residues in soils and sediments
3. The uncontrolled and illegal trade of pesticide products leading to the use of banned pesticide (e.g. DDT) by farmers is reported as a problem in many countries – although this sensitive issue is difficult to verify. There is particular concern that certain countries lacking an effective pesticide control system (e.g. Ukraine) are gaining a reputation as a "dumping market" for obsolete and illegal products
4. There are reports of high pesticide use in certain areas and on certain high value crops - this includes priority pesticides that pose a serious hazard to the environment and human health. In particular, the priority pesticides 2,4-D, Alachlor, Trifluralin, Atrazine and copper compounds are high use pesticides in most of the DRB countries. They are mostly used on cereals, rapeseed and sunflower, maize and in orchards and vineyards, respectively
5. Poor storage of pesticides, including old pesticide stores, continues to be a problem in many countries. In the Ukraine there are some 20.000 tons of obsolete pesticides still in storage often under bad conditions and posing a serious threat to human health and the environment (e.g. infiltration into groundwater). In Bulgaria, 35% of the pesticide storehouses are reported to be in bad condition. In Moldova some 6.000 tonnes of obsolete pesticides are reported to be in storage on former State and Collective farms, including single stores containing up to 4 tonnes. Several countries maintain databases with the location, amounts and storage conditions of the pesticides, including the use of GIS-based maps in Moldova and the Ukraine
6. Where pesticides are being used by farmers there are many examples of "bad practice" that contribute to the risk of pesticide pollution. Those most commonly reported by the national experts were:
    - **Use of pesticides in excess of recommended rates** – in particular, the over-application of maize with the herbicide Atrazine (up to 2-3 times the recommended rate) is consistently reported as a serious problem in the DRB countries. In many cases, over-application is due to lack of knowledge/training and the tendency to apply larger amounts in the belief that this will increase the effectiveness of the pesticide products – a tendency that is made worse now by the increasing occurrence of weed resistance to Atrazine. The overuse of Atrazine is arguably one of the most significant pesticide problems in the DRB and accentuated in countries where large areas of maize are grown and/or most of the maize is routinely treated with Atrazine – for example, in Croatia it is estimated that 87-100% of the 324,000 ha of maize grown is treated with Atrazine
    - The **unauthorised use of pesticides on crops they are not registered for** (e.g. use of Lindane on vegetables) is reported as a common problem in most countries
    - The **cleaning of spraying equipment and disposal of unused pesticide, pesticide containers and "spray tank washings"** nearby to (or even in!) water courses such as rivers and ponds
    - The **drift of pesticide spray to adjacent areas** due to the old spraying equipment used (most spraying equipment used in the DRB region is now more than 15 years old), plus poor knowledge and lack of operator training (e.g. spraying in windy conditions)
    - **Lack of knowledge of and/or compliance with obligatory "buffer zones"** for surface waters and other protected areas
    - The **poor timing of pesticide application** due to poor knowledge and lack of operator training leads to inefficient application and increased risk of pollution

Potential for Pesticide Pollution Control in the Central and Lower DRB Countries

The current low use of agricultural pesticides in the former communist countries of the central and lower DRB presents a unique opportunity to develop and promote more sustainable agricultural systems before farmers become dependent again upon the use of agro-chemical inputs.

However, pesticide use is always related to agricultural policy. Farmers grow those crops which are most economically viable - if agricultural policy, for example, supports subsidy schemes and market policies for a small number of crops, then the range of crops grown by farmers will limited, crop rotations be simple or non-existent and consequently pesticide use will rise.

There is, for example, concern that with EU enlargement and the expansion of the Common Agricultural Policy (CAP) into those DRB countries joining the EU there is a risk of pesticide use increasing again due to:

- increasing areas of cereals and oilseeds being grown due to the availability of EU direct payments for farmers growing these crops in the new Member States
- increased intensification of crop production, including the greater use of mineral fertilisers and pesticides, particularly in the more favourable areas with better growing conditions
- a reduction in mixed cropping and an increase in large-scale cereal monocultures in some areas which are dependent upon agro-chemicals for crop protection

There are numerous different policy instruments that can be used to control pesticide pollution – Summary Table 4 gives a general overview of these instruments.[6]

The control instruments presented in this table provide a framework that can be elaborated and filled with more detailed measures. However, the selection of the most appropriate policy instruments for the DRB countries will depend upon the establishment of a clear policy strategy for controlling pesticide pollution, together with clear policy objectives.

According to the aims of the Danube Protection Convention, the risk of pollution should be stopped at its source – with regard to pesticide use this is generally assumed to mean[7]:

a) **withdrawing approval** for the use of those pesticides that pose the greatest threats to public health and the environment
b) **reducing the use** of those pesticides that remained approved for use
c) **improving the management** by farmers of those pesticides that remain approved for use.

These outcomes can be achieved through a combination of necessary policy reforms and the promotion of appropriate practical action by farmers – the potential to achieve this however varies greatly between countries in the DRB. In particular the most important difference is between those countries currently preparing for EU accession and those that are not.

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[6] Falconer, K.E. (1998): Managing diffuse environmental contamination from agricultural pesticides: An economic perspective on issues and policy options, with particular reference to Europe, Agriculture, Ecosystems and Environment 69 (1998) 37-54

[7] OECD (1995). *Sustainable Agriculture: Concepts, Issues and Policies in OECD Countries*. Organisation for Economic Co-operation and Development, Paris.

Summary Table 4: Instruments Aiming at the Control of Pollution by Pesticides

Control Instrument	Target	Control Techniques	Compliance Measures
Advice	Environmentally more-sound pesticide usage; farmers using and acting on improved information	Improved advice and extension services; more crop protection research	None (voluntary measures by farmers)
Use reduction (ICM and IPM standards) **Use restriction**	Mode of use/timing/frequency of application/maximum dosage/restrictions on use, prohibitions in certain conditions or generally	Statutory labelling of formulations	Spot-checks, farm records, fines for non-compliance; self-regulation
Compulsory training	More socially desirable levels and types of pesticide usage (e.g. mode of application, timing)	Improve knowledge and understanding of farmers of necessity for treatments; increase decision rationality	Prohibit use or purchase of pesticides or spraying equipment without a certificate of competence
Performance standards (cut off criteria, eco-audits)	Soil loss/pesticide run-off or leaching	Limits on pesticide losses	Environmental simulation or field measurements
Design standards	Pesticide application	Sprayer specifications, buffer strips along water courses, field margins etc.	Farm inspections, spot-checks
Permits	Inputs, emissions, treated area, crop area	Limits on farm input use/emissions/ crop area	Farm records and inspections; coupons for pesticide input purchases, handed in at point of sale
Taxes	Input use, emissions, treated area, numbers of applications	Increase price of materials or applications, perhaps through a percentage levy or charge per unit, to encourage reduced pesticide usage.	Distributor and/or farmer records
Subsidies to change practices	Increased use of reduced dose/ non-chemical pest controls	Compensate farmers for financial losses resulting from changed practices	Farm inspections
Transferable permits	As above	Limits on total (for example, catchment) input use, emissions, crop area.	As above
Crop insurance	Reduced pesticide usage	Reduced prophylactic treatments	None (voluntary)

Source: Falconer modified

Recommendations for Policy Reform for Pesticide Pollution Control

The national governments of all central and lower DRB countries should aim to effectively control pesticide pollution in order to minimise the risks presented to human health, the quality of environmental resources and the integrity of natural ecosystems in the region.

The following objectives are recommended for all national strategies aiming to control pesticide pollution from agriculture, together with comments on policy instruments that should be adopted **where appropriate to national context** (not all policy instruments are appropriate to all countries):

OBJECTIVE 1: Reduce the levels of harmful active substances used for crop protection by prohibiting and/or substituting the most dangerous priority pesticides with safer (including non-chemical) alternatives

1.1 **Pesticide Ban** - the use of Atrazine, Lindane, Diuron and Endosulfan need to be banned immediately. Atrazine is the pesticide most often detected in the Danube basin, Lindane, Diuron and Endosulfan are toxic and persistent pesticides

1.2 **Pesticide Phase-out** - the use of all other priority pesticides, which are authorised should be reduced to a minimum, and the use should be phased out if possible, and substituted by less-dangerous pesticides, including non-chemical alternatives. Considering the current low levels of pesticide use and a lower dependency of farmers upon these chemicals in the DRB regions, the targets for further pesticide reduction can be ambitious

1.3 **Cut-off Criteria** - in order to prevent the replacement of the priority pesticides which are going to be banned or phased out with other hazardous pesticides, cut-off criteria for the approval of other pesticides need to be defined. Pesticides with distribution coefficients (K_{oc}) below 300g/l (low absorption to soil, prone to leaching and run-off) and a half life greater than 20 days need to be regulated (prohibition, taxes and transferable permits are possible policy tools). Persistent pesticides should not receive authorisation.

OBJECTIVE 2: Improve controls on the use and distribution of pesticides

2.1 **Monitor Trade** - retailers, importers and distributor should be required to supply information on the amounts of all pesticide sold. Retail sellers need to keep records of their sales of pesticide products and to submit annual reports to national authorities

2.2 **Control Trade** - all central and lower DRB countries must work towards stopping the uncontrolled and illegal trade of pesticides. The authorities on the borders should receive training on the issue of illegal pesticide trade. National legislation should enable authorities to effectively prosecute those selling illegal pesticides and to penalise them with high fines.

2.3 **Raise Awareness** – agricultural extension services and farmers should get access to information about the dangers of illegal and often unlabelled pesticides

2.4 **Monitor Pesticide Use** – effective monitoring of pesticide use at a farm level is an essential tool for improving the control of pesticide use and distribution, as well as assessing environmental risks, developing non-chemical alternatives etc. Uniform record keeping by farming is essential for a functioning pesticide monitoring system. National regulation must require that pesticide use records are both **kept** by all pesticide applicators (as in the Czech Republic and Slovakia) according to certain minimum standards and **reported** to the relevant authorities

2.5 **Elimination of Obsolete Pesticides** – all effort must be made to immediately secure and remove stockpiles of obsolete pesticides

OBJECTIVE 3: Encourage the proper use of pesticides by farmers and other operators

3.1 **Raise Farmer Awareness** - simple and easy to understand information materials, combined with well-targeted publicity campaigns, can be very effective at raising farmers' awareness of the dangers of improper pesticide use and the importance of key issues such as the safe storage, handling and disposal of pesticide products. Retail stores, extension services and other organisation working with farmers can serve as effective distributors of information material.

3.2 **Develop National Codes of Good Practice** – national authorities should agree upon clear and simple codes of good crop protection practice when using pesticides. There are numerous frameworks for such codes, but as a minimum they should provide guidance to farmers on:

- Basic elements of crop protection
- Choice of available chemicals for crop protection, including obsolete/illegal pesticides
- Integrated crop management and non-chemical alternatives for weed, pest and disease control
- Quantity and types of pesticide product to use
- Pesticide storage
- Use of spray equipment, including cleaning equipment
- Disposal of surplus pesticides and spray mixture (diluted pesticide)
- Disposal of empty pesticide containers
- Records of application
- Protective clothing and emergency procedures

3.3 **Mandatory Farmer Training** - comprehensive training is the most important instrument to prevent pesticide pollution at a farm level. All farmers and other operators (e.g. contract workers) who wish to purchase and apply pesticides should be required to have a license confirming that they have participated in an approved training programme. As a minimum, training should highlight the possible adverse effects of pesticides and promote the National Code of Good Practice for the storage of pesticides, safe handling and application of pesticides, correct use of spraying equipment, disposal of unused pesticide and containers, and record keeping (see above)

3.4 **Develop Appropriate Extension Capacity** – agricultural extension services play a key role in raising awareness and improving the technical skills of farmers with respect to good crop protection practice, however they often require support in developing the necessary capacity to do this. National funding should be provided for the training of advisers in good practice and modern extension techniques, as well as the development of appropriate institutional frameworks for extension services (including the link to progressive and well-funded research programmes)

3.5 **Use Economic Instruments to Promote Good Practice** – where government schemes are providing support to farmers then the principle of "environmental cross-compliance" can be applied. This involves the establishment of certain conditions (e.g. compliance with verifiable standards of good agricultural practice) that farmers have to meet in order to be eligible to receive government support.

OBJECTIVE 4: Promote certified organic farming, together with integrated crop management (ICM) systems, as viable alternatives to conventional pesticide use

4.1 **Raise Farmer Awareness** – viable alternatives to conventional pesticide use, such as organic farming and ICM, should be actively promoted to farmers through the preparation of simple and easy to understand information materials, combined with well-targeted publicity campaigns. Organic farming is the most well-developed of all alternative farming systems and possesses the highest potential for the reduction of the use of toxic pesticides (especially since the former intense use of copper compounds in organic vegetable and fruit has been controlled), plus there are a number of market opportunities available to organic farmers in the DRB countries

4.2 **Develop Relevant Legislation** – national legislation for the certification and inspection of organic farming systems in compliance with internationally recognised standards (particularly those in accordance with EC legislation) should be developed and implemented as a high priority in order to promote the development of domestic markets and international trade

4.3 **Develop Appropriate Extension Capacity** – agricultural extension services and farm advisers play a fundamental role in the re-orientation of farmers towards new production systems, particularly those such as organic farming and ICM, which require higher levels of technical knowledge and management. National funding should be provided for the development of appropriate extension capacity as 3.4 above

4.4 **Develop On-farm "Quality Assurance Schemes"** - in addition to their growing interest in organic food and farming, the food processing and retail sectors of many European countries are developing additional "on-farm quality assurance schemes" that offer promote integrated crop management and the sale of food products that have been grown with reduced or minimal pesticide inputs. National authorities in the DRB should support the development of such "market-led" initiatives since they offer both a potential market opportunity for DRB farmers and will contribute to reducing the risk pesticide pollution now and in the future

4.5 **Use Economic Instruments to Promote Organic Farming and ICM** – farmers converting to organic farming and ICM techniques can incur certain additional costs associated with reductions in input, establishment of new crop rotations, adoption of new technologies etc. These costs can be a significant obstacle to farmers deciding making the transition from a conventional farming system. Where funds are available, national authorities should encourage farmers to convert to organic farming and ICM by offering appropriate levels of compensatory payment. Since organic farmers often have problems to sell or export their products, the marketing of organically-grown products should also be supported by governmental campaigns and action.

Opportunities for Policy Reform in Relation to EU Enlargement

This review of pesticide use is undertaken during a period of great change in the Danube River Basin (DRB) with Hungary, Czech Republic, Slovakia and Slovenia in the final stages of preparation for accession to the EU in 2004, while Bulgaria and Romania preparing for EU accession in 2007 or later.

The policy-making context for agricultural pollution control in the DRB is therefore undergoing significant change and preparation for joining the EU is currently a major driving force for the reform of agricultural pollution control policies in the 6 countries mentioned.

This includes the requirement to:

- harmonise national legislation with EU regulatory instruments
- prepare rural development measures for EU co-financing
- develop the principle of "environmental cross compliance" – in other words, to set certain environmental standards that farmers must meet in order to be eligible for government support

Adoption of EU Legislation

In the European Union, there are several Directives addressing the **regulation** of pesticides, including:

- *Directive 79/117EC on the prohibition of pesticides*
- *Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive)*
- *Directive 80/778/EEC on the quality of water intended for human consumption (the Drinking Water Directive) – to be replaced by Directive 98/83/EC from 2003*
- *Directive 91/414/EEC concerning the placing of plant protection products on the market*
- *Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the Water Framework Directive)*

The Directive with the highest potential for the control of water pollution by pesticides is the Water Framework Directive 2000/60/EC (WFD). Similar to the previous Dangerous Substances Directive (76/464EC), which was repealed by the WFD, pollution control is based upon chemical lists. Three lists of substances were composed:

- an indicative list of main pollutants
- a list of priority substances and
- a list of priority hazardous substances.

The list of main pollutants consist of chemical classes and use types, therefore it includes priority substances and priority hazardous substances *per se*.

For **surface water** the Directive aims at the enhancement of the protection and improvement of the aquatic environment through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances.

For **groundwater** the Directive aims to ensure the progressive reduction of pollution of groundwater and prevents its further pollution. Member States must implement the basic measure of prohibiting direct discharges of pollutants into groundwater.

The WFD remains to be implemented, but has the potential for supporting pesticide pollution control in the DRB particularly in those countries that also have access to other policy tools available from the EU (see below).

Preparation of EU Rural Development Measures, including Agri-environment

The EU Rural Development Regulation 1257/1999 (the "second pillar" of the CAP) makes provision for Member States to encourage more environmentally-friendly farming methods, including practices and actions that reduce the risk of agricultural pollution.

This offers a great opportunity for supporting the control of pesticide reduction in those DRB countries preparing to join the EU, by allowing them to develop EU co-financed schemes that:

a) offer grant-aided investment (up to 50%) in agricultural holdings that helps to *"...preserve and improve the natural environment"* – for example, by purchasing up-to-date equipment for spraying pesticides in a more environmentally-friendly way
b) training farmers for the *"...application of production practices compatible with the maintenance and enhancement of the landscape and the protection of the environment"* – this includes:
    - training for organic farming or integrated crop management practices
    - training for farming management practices with a specific environmental protection objective
c) introducing agri-environment schemes that offer area payments to support *"...agricultural production methods designed to protect the environment and to maintain the countryside"* – this is very important tool for supporting the adoption of organic farming and ICM in orchard, vine and vegetable production, as well other pollution control techniques such as uncultivated buffer strips, conversion of arable to pasture land and the introduction of more diverse crop rotations.

Additionally, following agreement on proposals arising from the recent "mid-term review" of the CAP a new "meeting standards" measure will be introduced to "*help farmers adapt to the introduction of demanding standards based on EU legislation not yet included in national legislation concerning the environment, public, animal and plant health, animal welfare and occupational safety*". This will also potentially be useful for promoting better use of pesticides by farmers in the new EU Member States from the DRB.

While the 4 DRB countries (Czech Republic, Slovakia, Hungary and Slovenia) joining the EU in 2004 will shortly have the possibility to utilise the opportunities outlined above, the two remaining DRB countries of Romania and Bulgaria are unlikely to join the EU until at least 2007. However, financial

assistance is also available in these countries for developing and implementing similar measures with SAPARD co-funding – the Special Pre-accession Programme for Agriculture and Rural Development.

Developing the EU Concept of "Cross Compliance"

Following the Mid-term Review of the CAP all Member States will in future be required to issue farmers with a list of "minimum environmental requirements" that must be followed if they want to receive direct support payments from the government.

There are relatively few details available yet, but this will also have to be implemented by the new Member States in the DRB and is a potentially useful tool for reducing certain pollution risks – including from pesticides. Although inevitably the true extent of its influence upon reducing pollution will depend upon Member State's commitment and willingness to fully and effectively implement this new policy instrument.

Another useful tool will be the "verifiable standards of Good Farming Practice (GFP)" that all farmers receiving payments from agri-environment and less-favoured area schemes funded by the Rural Development Regulation - the so-called CAP 'Second Pillar' - must comply with across the whole of their farm[8].

Good Farming Practice (GFP) is a relatively new concept to emerge within the EU and its practical implementation is still being tested in many Member States. Obviously the interpretation of what constitutes a "reasonable" standard of farming will vary from country to country, however it is generally assumed that it will consistently involve farmers:

- following relevant existing environmental legislation, and;
- not deliberately damaging or destroying environmental assets, including the pollution of watercourses.

GFP is likely to become an even more important element of agricultural policy in future and is very relevant to promoting the better use of pesticide use by farmers, especially on those areas of the farm that are not suitable for agri-environment payments and continue to be farmed relatively intensively.

[8] Under Section 9 of EC Regulation No. 1750/1999, which sets out the rules for several measures including agri-environment, it is stated that: *"Usual good farming practice is the standard of farming which a reasonable farmer would follow in the region concerned.....Member states shall set out verifiable standards in their rural development plans. In any case, these standards shall entail compliance with general mandatory environmental requirements."*

Annex 5: Summary of Inventory of Fertiliser and Manure Use

Inventory of Mineral Fertiliser Use in the Central and Lower Danube River Countries with Reference to Manure and Land Management Practices: SUMMARY REPORT

Policies for the Control of Agricultural Point and Non-point Sources of Pollution: Output 1.2

September, 2003

Prepared by: Dr Mark Redman, GFA Terra Systems in co-operation with Avalon

Introduction

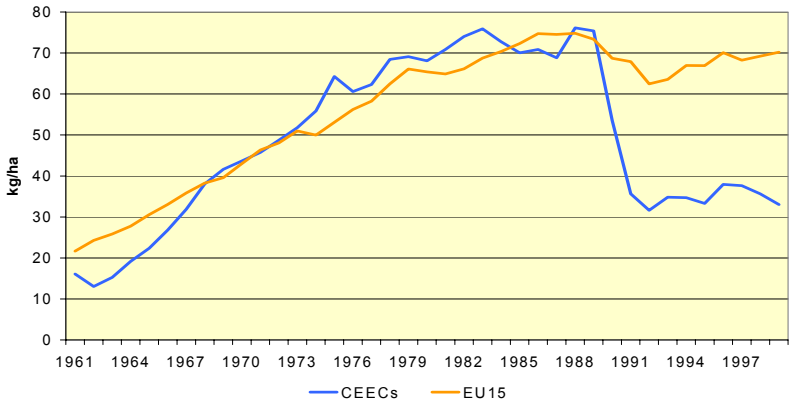
The collapse of the centrally-planned economies of central and eastern Europe in the early 1990s caused a social and economic crisis that profoundly affected agriculture in the central and lower Danube River Basin (DRB).

The market situation changed drastically, with average consumer income decreasing, causing a lowered demand for agricultural products. In addition, important foreign markets, such as the former Soviet Union, were lost. At the same time, large-scale restructuring of the agricultural sector occurred. Land was privatised and most of the collectivised/state farm structures were dismantled. However, in many of the former communist DRB countries the registration of new landownership progressed only slowly (e.g. due to the complexities of the privatisation process, poor management, disputes etc.), adding to the uncertainties of the individual farmer.

The economic crisis also put pressure on national budgets. As a result, state support to the agricultural sector was reduced drastically. To make things worse, capital and credit facilities were lacking in the private sector. These changes inevitably led to a significant reduction in agricultural productivity in the region, including a decline in the use of external inputs such as mineral fertilisers[9].

Reliable data on mineral fertiliser use in the central and lower DRB region are not available for the decades leading up to 1990. However, the limited data available from the FAOSTAT database shows that after rising strongly for three decades the use of N fertilisers (kg N/ha) by farmers in the former communist DRB countries dropped by approximately 50% around the year 1990 and is now far below the EU average (Figure 1). The decline in fertiliser use was more severe in some countries than others – in Bulgaria, the average application rate of fertiliser N fell from 109.9 kg N/ha in 1981 to 29.9 kg N/ha in 1999. Similar declines can also be observed for phosphate (P) and potash (K) use – again in Bulgaria, the average application rate of P and K fell from 90.2 kg P_2O_5/ha and 26.8 kg K_2O/ha in 1981 to 2.2 kg P_2O_5/ha and 1.2 kg K_2O/ha in 1999[10].

Figure 1: Long-term trends in nitrogen fertiliser use (kg N/ha) in selected central and lower DRB countries and EU Member States[11]



Source: *FAOSTAT - database of the UN Food and Agriculture Organization.*

[9] "Mineral fertilisers" are defined as nutrient-containing fertiliser products which have been manufactured for sale to farmers

[10] Data supplied by the National Statistical Institute, Sofia

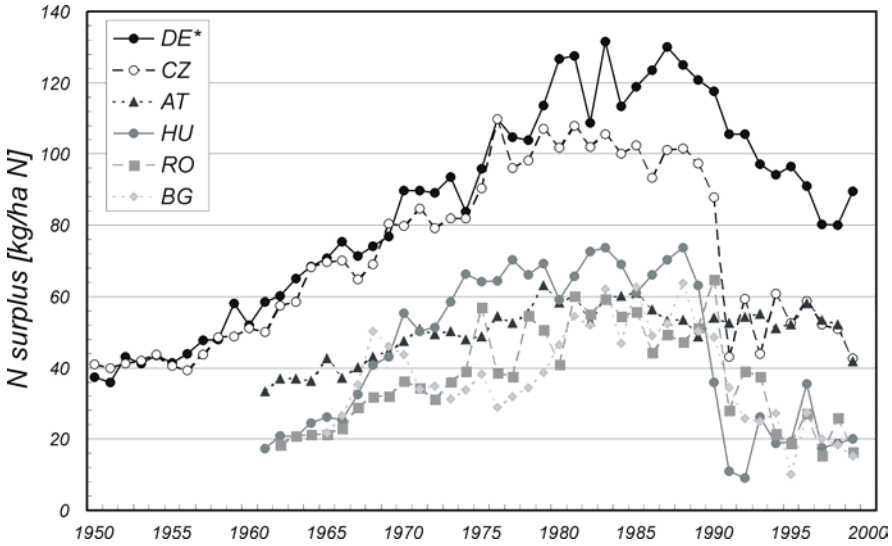
[11] Due to limited data availability, the description of the trend in N fertiliser consumption is limited to the following DRB countries: Bulgaria, Czech Republic, Hungary, Romania and Slovakia

In all countries, the reduction in the use of mineral fertilisers was the result of economic necessity rather than environmental awareness. The lack of working capital on new private holdings and remaining collective farms made it difficult to buy in more than the minimum of farm inputs. For most farmers, the low level and fluctuation of agricultural product prices, as well as uncertainty over land ownership, have it made it advisable to operate with a minimum of costs since there is no guarantee of any returns on investment, including farm inputs.

At the same time, significant changes also occurred in livestock production. The de-collectivisation and privatisation of the state-controlled animal breeding complexes was particularly dramatic in many DRB countries and led to a significant decline in livestock numbers by approximately 50% in most countries, as well as a major change in the way that farm animals are kept. For example, when state-controlled dairy units were liquidated cattle were commonly distributed amongst former employees. However, new owners were short of facilities for keeping cattle, feed was expensive and land was not easy to buy or lease ahead of the land restitution process. These circumstances were not favourable to the formation of new dairy farms and many cattle were sold for slaughter.

With the decline in livestock numbers there has also been a decline in the availability of manure as a traditional source of crop nutrients. When taken together with the reduced use of mineral fertilisers, this has resulted in a decline in the nutrient balance[12] of many agricultural soils in the middle and lower DRB countries to the point that many agricultural scientists in the region are concerned that farmers are now relying principally upon the fertility reserves of the soil to maintain their relatively low levels of crop yield.

Figure 2: Long-term changes in the N balance (kg N/ha) of agricultural areas in selected DRB countries (including Austria and Germany – Bavaria and Baden-Wuertemburg only)



Source: Various – compiled by Schreiber *et al.* (2003)[13]

[12] Nutrient balances (particularly nitrogen balances) are a key agri-environmental indicator and calculate the balance between nutrients added to an agricultural system (fertilisers, livestock manures, biological N fixation, atmospheric deposition etc.) and nutrients removed from the system (marketable products) per hectare of agricultural land. A deficit (negative balance) suggests that the system is losing fertility, while a large surplus (large positive balance) indicates the risk of nutrient loss and therefore potential pollution

[13] Schreiber, H. *et al.* (2003). *Harmonised Inventory of Point and Diffuse Emissions of Nitrogen and Phosphorous for a Transboundary River Basin*. Research Report 200 22 232, Federal Ministry of the Environment, Nature Conservation and Nuclear Safety, Germany.

The long-term changes in the N balance/surplus (kg N/ha) of agricultural areas in selected DRB countries are shown in Figure 2 above. All the countries shown are characterised by a slow long-term increase in N balance from the 1950s/1960s until the end of the 1970s – the period of most rapid intensification of agricultural production in most European countries. Depending upon the original starting level, the N balance/surplus observed in most countries reached a relatively high, but stable plateau in the 1980s. During the 1990s, however, the changes in N balance/surplus observed are very different between:

- the gradual decline seen in the upper DRB countries of Germany and Austria, and
- the dramatic fall of 40-50 kg N/ha seen within a few years in the former communist countries of the central and lower DRB.

Changes in N balance/surplus are commonly used as an indicator to highlight areas potentially at risk from pollution[14] – consequently the observed fall in N balance in the countries of the central and lower suggests a significant reduction in the risk of surplus N being lost from agricultural land to the wider environment, notably by nitrate leaching.

Table 1 further presents the most recent calculations (1998-2000) of N balance/surplus for all national territories falling within the DRB[15] together with the agricultural area of each country within the catchment and the estimated N loss by diffuse pollution (tonnes N/year) from this agricultural area. The national territories are divided between the upper DRB countries (Germany and Austria) that are not the subject of this project and the middle/lower DRB countries that are under study. Within each category the countries are ranked according to estimated N balance/surplus.

There is a wide variation in the estimated N balances of the agricultural areas of the central and lower DRB countries ranging from 73.6 kg N/ha in Slovenia to 11.9 kg N/ha in Serbia & Montenegro. Furthermore the countries fall into two distinct groups that currently suggest there is:

- the highest potential risk of N losses, such as nitrate leaching, occurring from agricultural land in the territories of Slovenia, Czech Republic and Croatia – although the N surplus in these countries is less than in Germany and previously reported in other EU Member States (e.g. national N surpluses for farmland in Luxembourg and the Netherlands were estimated to be 121 and 213 kg N/ha respectively in 1995[16])
- a lower risk of N loss from the remaining countries all of which have N surpluses estimated to be less than 25 kg N/ha.

However, this situation provides no grounds for complacency in the lower and middle DRB countries since whilst national nutrient balances are useful tools for tracking change and making comparisons between countries/national territories, they:

- may hide considerable regional or local nutrient surpluses that are susceptible to high losses particularly where they occur on vulnerable soils or where groundwater is close to the surface
- do not provide any information about how well farmers are managing the (often limited) amounts of mineral fertiliser and manure that they are applying
- take no account of the risk of small point source pollution occurring from farms wherever manures and other livestock wastes are poorly handled or stored

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[14] Although the calculation of N surplus cannot be immediately interpreted as an indicator of loss of nitrogen to water. The balance between inputs and outputs for a system contains all potential losses, plus any change in the store of nitrogen, principally within the soil. The potential loss pathways for nitrogen are:

- to air as ammonia by direct volatilisation after spreading of manure on the field
- to air as nitrous oxide and nitrogen gas by denitrification
- to groundwater by nitrate leaching and in organic compounds
- to rivers and lakes through run-off after heavy rainfall

[15] These calculations will be further updated within the framework of this project

[16] Source: EUROSTAT quoted by EEA (2000). *Environmental Signals 2000*. Environmental Assessment Report No.6, European Environment Agency, Copenhagen

Table 1: Summary of data (1998–2000) from the MONERIS model showing a) estimates of nitrogen balance/surplus (kg N/ha), b) agricultural area (km^2) and c) estimated nitrogen loss by diffuse pollution (tonnes N/year) for all national territories within the Danube river basin catchment

	Country	Estimated N Balance (kg N/ha)[17]	Agricultural Area within Danube Catchment Area (km^2)	Estimated N Loss by Diffuse Pollution (tonnes N/year) [18]
Upper DRB Countries	Germany	90.9	32 839	75 553
	Austria	44.0	29 639	28 900
Middle and Lower DRB Countries	Slovenia	73.6	6 153	10 629
	Czech Republic	46.8	13 054	16 314
	Croatia	39.2	18 011	14 886
	Slovakia	23.9	23 890	16 702
	Hungary	21.9	66 400	8 700
	Romania	21.5	112 931	68 366
	Moldova	19.1	11 474	2 113
	Bulgaria	16.8	35 946	18 197
	Bosnia & Herzegovina	15.9	13 778	7 332
	Ukraine	15.7	19 433	13 976
	Serbia & Montenegro	11.9	46 686	10 487
	Other		296	388
		TOTALS	**430 530** km^2	**292 543** t N/year

Source: Schreiber *et al.* (2003)[19] and personal communication with the MONERIS project, IGB Berlin

[17] Nutrient balances for the Danube river catchment were prepared for the MONERIS model using the standard OECD soil surface nitrogen balance methodology with crop and livestock data supplied by national consultants for selected countries. Where these data were not available, figures from the OECD and FAO databases were used

[18] The total contribution of agricultural non-point source pollution to nutrient emissions into the Danube river is estimated by the MONERIS model (IGB Berlin) as the sum of losses via Surface Run-off, Erosion, Tile Drainage and Groundwater less Background losses

[19] Schreiber, H. *et al.* (2003). *Harmonised Inventory of Point and Diffuse Emissions of Nitrogen and Phosphorous for a Transboundary River Basin*. Research Report 200 22 232, Federal Ministry of the Environment, Nature Conservation and Nuclear Safety, Germany.

Aims of the Report and Approach Taken

The aim of this report was to develop an inventory of fertiliser market products for the central and lower DRB on a country-by-country basis and to review their typical use, misuse and potential for reduction of environmental impact.

Due to the limited availability of data sources on mineral fertiliser use in the region, national experts in each of the DRB countries under study were asked to undertake a survey of:

1. **amounts** of mineral N and P fertilisers typically applied in their won country and **how** they are used (e.g. what crops are they applied to)
2. any information available on **bad practice** by farmers regarding the use of these fertilisers

A simple questionnaire approach was used that took the experts through 4 key steps:

Step 1 – identification of the types of N and P mineral fertiliser (including the nutrient-containing chemicals and materials) that are commonly used in agriculture and horticulture.

Step 2 – estimation of the total consumption of N and P mineral fertilisers by farmers for the years 1997 - 2002. All data collected was for the amount of nutrient (N or P) not the amount of fertiliser product/chemical (for example, 1 tonne of ammonium nitrate typically contains only 345 kg of nitrogen)

Step 3 – collection of information on the characteristics of N and P mineral fertiliser use by farmers, including:

- approximately what percentage of the crops grown currently have mineral fertilisers applied to them
- the current average or "typical" application rate (kg per ha) for N and P fertilisers
- the typical time of fertiliser application (e.g. in autumn or spring)

Step 4 – identification of problems relating to the use of mineral fertilisers, including known "bad practice" such as:

- using application rates that are higher than recommended rates (unlikely in many countries)
- poor application due to old or poorly maintained equipment
- spreading too closely to water sources e.g. streams and rivers
- applying mineral fertiliser at an inappropriate time of year (i.e. when the crop is not growing)

Use of Mineral Fertilisers in the Central and Lower DRB Countries

A range of mineral fertiliser products containing nitrogen (N) and phosphorus (P) are available to farmers in DRB countries – those products typically being used by farmers are summarised in Table 2. There are no consistent patterns to the products being, except to say that the most commonly used products in any country are inevitably those that are locally the cheapest such as ammonium nitrate, calcium ammonium nitrate (CAN) and urea.

Figure 3 shows the annual total consumption (millions tonnes) of N and P mineral fertilisers in all DRB countries under study during the period 1997 – 2002. Whilst there has been little change in total P fertiliser use, there appears to be a discernable trend towards increasing N fertiliser consumption with an 18% increase between 1997 and 2002.

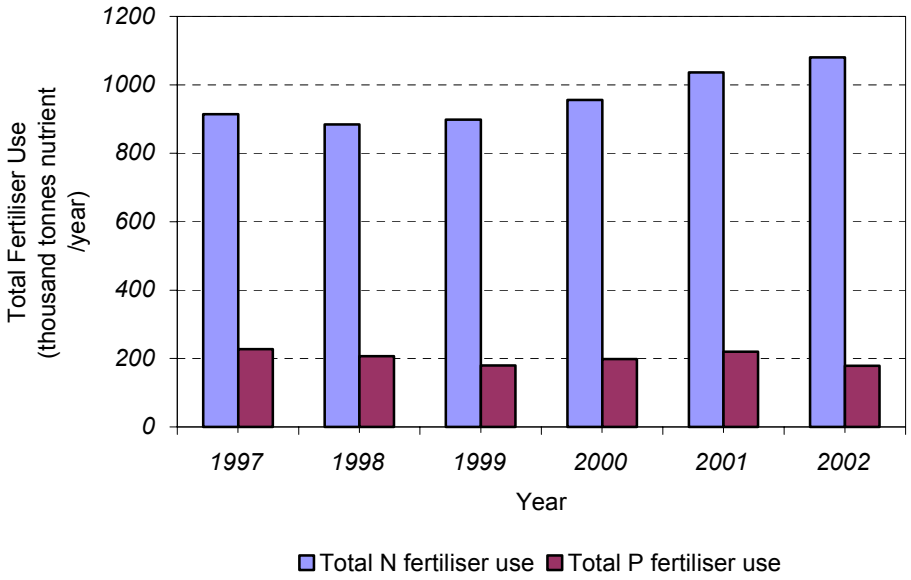
However, this aggregate increase obscures:

- a 30% increase in total N fertiliser consumption in the 4 DRB countries preparing for EU accession – either as the result of more land being fertilised by farmers and/or an increase in fertiliser application rate (i.e. farmers applying more fertiliser N per hectare).
- reductions of up to 50% in total N fertiliser consumption in some of the other central and lower DRB countries, including Romania, Ukraine and Serbia & Montenegro

Table 2: Types of N and P Fertiliser Commonly Used by Farmers in DRB Countries
(Note that the most commonly used fertiliser products for each country are marked with ✓✓)

Fertiliser Type	**% N/P**	**DRB Country**										
		BH	BG	HR	CZ	HU	MD	RO	SK	SL	UA	YU
Straight N Fertilisers:												
Ammonium sulphate	21% N	✓	✓		✓	✓		✓	✓	✓	✓	
Ammonium nitrate	30-35% N	✓	✓✓	✓		✓	✓✓	✓	✓	✓	✓	✓
Calcium nitrate	15% N	✓			✓	✓				✓	✓	✓
Calcium ammonium nitrate	27% N	✓✓		✓✓	✓✓	✓			✓✓	✓✓		
Urea	46% N	✓✓		✓✓	✓	✓✓	✓	✓	✓	✓	✓	✓
Anhydrous ammonia	82% N	✓				✓						
Aqueous ammonia	25-29% N	✓			✓✓			✓				
Other		✓	✓	✓		✓			✓	✓	✓	✓
Straight P Fertilisers:												
Rock phosphate		✓	✓									✓
Superphosphate	< 25% P_2O_5		✓			✓			✓✓		✓	
Concentrated superphosphate	> 25% P_2O_5	✓✓	✓		✓	✓		✓	✓			✓
Calcium phosphate		✓	✓									✓
Other		✓	✓			✓			✓			
Compound N-P-K Fertilisers:												
Mono-ammonium phosphate		✓	✓	✓✓	✓	✓	✓	✓	✓	✓	✓	✓
Di-ammonium phosphate		✓	✓			✓		✓				
Other		✓	✓		✓	✓	✓		✓	✓	✓	✓

Figure 3: Annual total consumption of N and P (thousand tonnes nutrient/year) as fertiliser products in the central and lower DRB countries (1997 - 2002)



Source: Data submitted by GFA National Experts

The existing trend towards increasing fertiliser N consumption in the 4 acceding countries is a cause for concern since it is likely to be reinforced by EU enlargement and the implementation of the Common Agricultural Policy (CAP) leading to increasing areas of cereals and oilseeds being grown due to the availability of EU direct payments; increased intensification of crop production, particularly in the more favourable areas with better growing conditions, and a possible reduction in mixed cropping due to an increase in large-scale cereal monocultures.

Detailed information from the survey of typical fertiliser use is included in the Main Report, but Table 3 summarises the results for N fertiliser use on wheat – a crop that is commonly grown in all DRB countries. The results show a wide variety of typical practices with some surprisingly high application rates reported in certain countries (e.g. YU!) – however there appear to be 3 basic groups of typical fertiliser practice:

- virtually all of the crop area receives relatively high N application e.g. HR and HU
- virtually all of the crop area receives moderate N application e.g. SI and SK
- significant proportion of the crop areas receives no N application and the remaining crop areas receives small or moderate N application e.g. RO and MD

Table 3: Summary of typical fertiliser use on wheat in central and lower DRB countries

Country	Crop Receiving N Fertiliser	Typical Application (kg N/ha)	Typical Timing of Application	Comments
BH	50-60%	95-160	Autumn* & spring	Typical NPK fertiliser to apply in the seed-bed is 15:15:15 followed by to-dressing with CAN or urea in spring
BG	78%	86	Autumn* & spring	2001/2002 data
HR	95-100%	100-120	Autumn* & spring	
CZ	98%	90	Spring	
HU	95%	100-110	Autumn* & spring	
MD	60-75%	35-55	Spring	
RO	45%	30-66	Autumn*	Typical NPK fertiliser where used is 45:23:0.5
SK	90-100%	40-90	Mostly spring	
SI	90%	40-60	Autumn* & spring	
UA	60%	33	Spring	
YU	95%	250	Spring	

* for winter wheat

Problems Regarding the Application of Mineral Fertilisers and Manure to Land in the Central and Lower DRB Countries

The total amounts of mineral fertiliser applied to agricultural land are certainly an important consideration in assessing the environmental impact of agriculture upon water quality and there is also little doubt that the reduction in fertiliser use in the central and lower DRB countries has contributed to a reduction in nutrient losses.

However, the environmental impact of fertiliser use is also closely related both to:

a) the way in which farmers apply fertilisers to their crops and

b) the overall management of their farming system

In particular, the changes in management practice required to optimise the use of mineral fertilisers and avoid their misuse are related to the application of manure and slurry to agricultural land, as well as other soil management practices such as cultivations.

Typical problems and "bad practice" identified by the GFA national experts during preparation of the fertiliser inventory included:

- there is a widespread ignorance of ideas such as "pollution" or environment" amongst farmers and no information on the importance of managing fertilisers and manures properly
- farmers often consider manure as a "waste product" rather than a source of nutrients that should be used carefully to save money spent on fertilisers
- the agricultural workforce often consists of more elderly people familiar only with previous farming methods and who have little (if any) agricultural education and do not understand the importance of applying fertilisers and manures correctly to the soil
- the machinery used for spreading fertilisers is outdated and not appropriate for the modern agricultural operations – consequently application is uneven and commonly results in areas of "under" and "over"-fertilisation. Farmers do not have the knowledge or experience to adjust/operate the equipment correctly
- many cheaper mineral fertilisers are only "milled" and during storage become compacted again which makes uniform spreading very difficult
- fertilisers and manures are commonly stored in unauthorised places where there is a risk of causing pollution
- there is a tendency in some areas for farmers to grow the same crop (or same simple rotation of crops) for many years without application of fertiliser or manures. This is leading to a serious decline in soil fertility and the risk of increasing soil erosion due to loss of soil organic matter
- farmers do not consider the nutrient requirements of the crops they are applying fertilisers (and manures) to
- it is not very common for farmers to practice soil testing before deciding where to apply fertilisers and manures and in what quantities
- farmers and agronomists do not sufficiently recognise the potential value of nutrients in livestock manure. Consequently the application rate of fertilisers is not adjusted and nutrients are wasted because they are surplus to the crop's requirement
- bad timing of fertiliser application is a common problem, especially when applying large amounts of fertiliser to higher value crops such as vegetables and potatoes. There are many reasons for this including poor knowledge and no access to agronomic advice, but also lack of necessary equipment when needed
- application of nitrogen to soil in autumn before planting a spring crop is common practice in some countries. It is not understood that the nitrogen can be lost over winter. Spreading fertiliser and manure to frozen and snow covered ground is also common in some countries
- over-application of fertiliser N at the time of sowing a crop is a common problem

- compound fertilisers are often applied with inappropriate balance of nutrients and there is tendency to under-fertilise with P and K
- nitrate losses from agricultural land are associated with farming practice not just the rate of fertiliser or manure application – factors that continue to contribute to high levels of nitrate leaching are poor timing of application, regular cultivations and the ploughing of grassland, legumes and other crop residues
- fertilisers (and manures) are spread too closely to surface waters – rivers, lakes, ponds, streams and springs
- fertilisers (and manures) are spread on sloping land where there is the risk of surface run-off from heavy rain washing them into nearby rivers and streams
- even though the number of farm animals has declined and the quantity of animal wastes produced is less, most farmers do not have good storage facilities for manure and slurry – therefore manures and slurries are being applied at inappropriate times (e.g. autumn and winter) when there is a high risk of leaching or run-off
- because of simplified tax systems in many countries for households and private agricultural plots, including small farms, there is no official obligation for them to have a book-keeping system. As a result they do not keep records of their purchases or use of fertilisers, manures or other relevant information (e.g. crop yields or sales) and there is therefore no reliable information regarding application of fertilizers

"Good Practice" for Improving the Management of Fertilisers and Manures and Reducing the Risk of Diffuse Pollution

In order to reduce the risk of diffuse pollution by nutrients (N and P) from agriculture it is necessary to encourage practical farm management techniques that minimise the opportunities for nutrients to accumulate in a form that is susceptible to loss.

By using current and evolving scientific knowledge it is possible to develop simple practical guidelines for the management of the nutrient inputs most commonly used by farmers – namely mineral fertilisers and manures. These should be applicable to all farmers at little or no cost thereby minimising the need for financial incentives – furthermore, it should always be stressed to farmers that improvements in nutrient management also means improvements in productivity, cost-effectiveness and ultimately profit.

The following typical management practices are commonly promoted to reduce the risk of nitrate leaching (especially during periods of high risk, such as the autumn and winter months):

1. Ensure that fertiliser N is applied according to the crop's requirement and taking account of:
   - the crop species/variety, expected yield and required quality
   - the natural supply of N from the soil, including N released from soil organic matter, crop residues and applied manure/slurry
2. Avoid applications of N fertilisers and manure/slurry in autumn and very early spring when crop requirements for N are very low
3. Limit the application rate of organic manure/slurry to ensure that N supply does not exceed crop requirements – this includes applying in smaller quantities at regular intervals to match more closely the crops requirement for nutrients during the growing season
4. Take special care when applying fertilisers and manure/slurry on fields where there is a risk of run-off to surface waters
5. When applying fertilizers/manures, ensure that an adequate distance (a "buffer zone") is kept away from surface waters to avoid the risk of direct pollution
6. Ensure accurate calibration of fertiliser spreading equipment to minimise the risk of excessive application
7. Minimise the period when the soil is left bare and susceptible to nitrate leaching by increasing the area sown to winter crops, cover crops and grassland, whilst decreasing the areas sown to spring crops
8. Sow winter crops early in the autumn to increase nitrate uptake prior to the onset of the winter leaching period
9. Restrict the ploughing of old grassland.since this leads to excessive amounts of nitrate being produced by the natural process of mineralisation and commonly leads to high levels of nitrate leaching

It must be remembered, however, that diffuse nutrient losses from agriculture are greatly influenced by climate, soil type, cropping system and the forms and quantity of fertiliser and manure applied. Additionally diffuse losses of P are influenced by factors such as the vulnerability of soil to erosion. The typical management practices outlined above must therefore always be elaborated and expanded upon according to different national – and ideally regional/local – contexts.

Technological and scientific developments will also play a major role in continuing to improve the efficiency of nutrient use in agriculture – for example, the use of high technology for targeting fertiliser inputs in cereal production through the use of so-called "precision farming techniques" offers considerable opportunity to both improve the efficiency and profitability of fertiliser use, as well further reduce nutrient losses. But for the moment such technology remains very capital intensive and beyond the reach of most farmers.

The important thing is to ensure that the practical guidance developed for "good practice" is flexible and pragmatic – this is likely to involve the combination of both new technologies and more traditional nutrient conserving techniques such as those outlined above.

Recommendations for Policy Reform to Reduce Diffuse Pollution from the Application of Mineral Fertilisers and Manure to Land

Despite the relatively low levels (compared to many EU Member States) of mineral fertiliser and manure currently applied to agricultural land in the central and lower DRB region, national governments should take seriously the risk of diffuse pollution arising from fertiliser and manure application.

The following objectives relating to fertiliser and manure application are recommended for all national strategies aiming to control nutrient pollution from agriculture. Comments are also included on policy instruments that should be adopted **where appropriate to national context**[20]**:**

OBJECTIVE 1: Develop greater understanding at a national/regional level of the relationship between agricultural practice (fertiliser, manure and land management) and the risk of diffuse nutrient pollution

1.1 **Establish progressive and well-funded research programmes** – whilst scientific understanding of nutrient losses from agricultural land and the related transport processes to ground and surface waters has increased in recent years this cannot be applied uniformly across the DRB for the development of good/best practice. Country/regional specific guidance for farmers must be based upon an understanding of the behaviour of nutrients in the specific agronomic, environmental and socio-economic context of each country. For example:

- the nutrient content of animal manures need to be quantified to aid more precise application
- the nutrient losses from different components of the farm system to be measures and the causes of these losses established
- the underlying soil processes affecting nutrient availability (e.g. soil mineralisation) need to be better understood

OBJECTIVE 2: Develop appropriate policy instruments and institutional arrangements for promoting better management of fertilisers and manures

2.1 **Raise Farmer Awareness of Good Practice** - simple and easy to understand information materials, combined with well-targeted publicity campaigns, can be very effective at raising farmers' awareness of the importance of improving the management of fertilisers and manures – a key message to communicate is that better nutrient management increases productivity, saves money and improves profitability.

2.2 **Develop and Promote National Codes of Good Practice** – national authorities should agree upon clear and simple codes of voluntary good practice for fertiliser and manure management. This should be specific to national context and ideally linked to/derived from progressive and well-funded research programme (see 1.1 above)

2.3 **Use Economic Instruments to Promote Good Practice** – where government schemes are providing support to farmers then the principle of "environmental cross-compliance" can be applied. This involves the establishment of certain conditions that farmers have to meet in order to be eligible to receive government support and can easily be adapted to the promotion of good practice for fertiliser and manure management. Additionally, payments to farmers from agri-environment schemes (where implemented) can be conditional upon certain standards for fertiliser and manure management. Appropriate financial disincentives might also be developed.

2.4 **Develop Appropriate Extension Capacity** – agricultural extension services play a key role in raising awareness and improving the technical skills of farmers with respect to good practice for

[20] Not all policy instruments are appropriate to all countries

fertiliser and manure management, however they often require support in developing the necessary capacity to do this. National funding should be provided for the training of advisers in good practice and modern extension techniques, as well as the development of appropriate institutional frameworks for extension services (including the link to progressive and well-funded research programmes – see 1.1 above)

OBJECTIVE 3: Promote certified organic farming and other low input farming systems as viable alternatives to the conventional use of fertilisers

3.1 **Raise Farmer Awareness** – alternative farming systems, such as organic farming, should be actively promoted to farmers through the preparation of simple and easy to understand information materials. Organic farming is the most well-developed of all alternative farming systems and has good potential to reduce nutrient losses through the avoidance of the most soluble forms of mineral fertiliser, more rational use of manures and use of more diverse crop rotations (e.g. increased winter crop cover) - whilst also contributing to the reduction of pesticide pollution etc.

3.2 **Develop Relevant Legislation** – national legislation for the certification and inspection of organic farming systems in compliance with internationally recognised standards (particularly those in accordance with EC legislation) should be developed and implemented as a high priority in order to promote the development of domestic markets and international trade

3.3 **Develop Appropriate Extension Capacity** – agricultural extension services and farm advisers play a fundamental role in the re-orientation of farmers towards alternative production systems, particularly those such as organic farming, which require higher levels of technical knowledge and management. National funding should be provided for the development of appropriate extension capacity as 2.4 above

3.4 **Use Economic Instruments to Promote Organic Farming** – farmers converting to organic farming techniques can incur certain additional costs associated with reductions in input, establishment of new crop rotations, adoption of new technologies etc. These costs can be a significant obstacle to farmers deciding making the transition from a conventional farming system. Where funds are available, national authorities should encourage farmers to convert to organic farming by offering appropriate levels of compensatory payment. Since organic farmers often have problems to sell or export their products, the marketing of organically-grown products should also be supported by governmental campaigns and action.

Opportunities for Policy Reform in Relation to EU Enlargement

As noted in the other summary reports, this review of fertiliser use is undertaken during a period of great change in the Danube River Basin (DRB) with 4 countries (Hungary, Czech Republic, Slovakia and Slovenia) in the final stages of preparation for accession to the EU in 2004 and 2 countries (Bulgaria and Romania) preparing for EU accession sometime after 2004.

The policy-making context for agricultural pollution control in the DRB is therefore undergoing significant change and preparation for joining the EU is currently a major driving force for the reform of agricultural pollution control policies in the region.

Adoption of EU Legislation

In the European Union, there are three Directives that address the problem of excess nutrient losses from agriculture:

- *Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive)*
- *Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources*
- *Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the Water Framework Directive)*

Of these, only the Nitrate Directive 91/676 currently places any direct obligation upon farmers and for over a decade has effectively promoted a variety of good practices for reducing diffuse nitrate pollution by nitrates through a variety of good agricultural practices, including good practices in fertiliser and manure application.

The objectives of the Directive are two-fold: i) to reduce water pollution caused or induced by nitrates from agricultural sources and; ii) to prevent further pollution occurring. The Directive requires EU Member States to identify waters affected by nitrate pollution (as well as waters which could be affected) and to designate the areas draining into these as Vulnerable Zones. Within these zones, the Member States must draw up Action Programmes for the reduction of nitrate leaching – these Action Programmes must contain certain mandatory measures such as limit upon the maximum amounts of manure that can be applied to farmland every year.

Member States are also required to establish at least one *Code of Good Agricultural Practice* which is implemented on a voluntary basis outside the Vulnerable Zones, and is mandatory within them. Annex II of the Nitrate Directive, provides guidance on what a code of good agricultural practice should contain. It requires that all codes *should* contain measures (where relevant) addressing 6 key issues:

1. periods when land application of fertilizer is inappropriate
2. the land application of fertilizer on steeply sloping ground
3. the land application of fertilizer on water-saturated ground, flooded, frozen or snow-covered ground
4. the land application of fertiliser near water courses
5. the capacity and construction of storage vessels for livestock manures and other liquid farm wastes, such as effluent from silage
6. procedures for the land application (including rate and uniformity) of both chemical fertilizer and animal manure that will maintain nutrient losses to water to an acceptable level

Additionally, the Directive suggests that Member States *may* also include in their code(s) of good agricultural practice additional measures that address the following 4 issues:

7. land use management, including the use of crop rotation systems and the proportion of the land area devoted to permanent crops relative to annual tillage crops
8. maintenance of minimum quantity of vegetation cover during rainy periods that will take up the nitrogen from the soil that could otherwise cause nitrate pollution of water

9. the establishment of fertilizer plans on a farm-by-farm basis and the keeping of records on fertilizer use
10. the prevention of water pollution from run-off and downward water movement beyond the reach of crop roots in irrigation systems.

Unfortunately, the Nitrates Directive has consistently failed to meet its environmental objectives and has suffered from both considerable resistance by the EU agricultural community and poor implementation by many Member States[21]. One problem has been the lack of appropriate tools – particularly economic instruments - to support implementation of the Directive. For example, Member States have not been able to offer farmers agri-environment payments to encourage them to meet the obligatory reductions in fertiliser application required in designated "nitrate vulnerable zones" under the Nitrate Directive because EU rules currently prevent agri-environment payments being made to farmers for complying with the requirements of EU legislation.

It is now hoped that similar rules will not be applied to implementation of the Water Framework Directive 2000/60 since this will significantly limit its ability to promote the use of economic instruments available under the CAP to reduce the risk of nutrient losses from agricultural land and promote the improvement of water quality.

Preparation of EU Rural Development Measures, including Agri-environment

The EU Rural Development Regulation 1257/1999 (the "second pillar" of the CAP) makes provision for Member States to encourage more environmentally-friendly farming methods, including practices and actions that reduce the risk of agricultural pollution. This offers a good opportunity for supporting the control of nutrient pollution in those DRB countries joining the EU, by allowing them to develop EU co-financed schemes that:

a) offer grant-aided investment (up to 50%) in agricultural holdings that helps to *"...preserve and improve the natural environment"* – for example, by purchasing new manure storage facilities or purchasing more up-to-date equipment for fertiliser and manure application
b) training farmers for the *"...application of production practices compatible with the maintenance and enhancement of the landscape and the protection of the environment"* – this includes:
   - training for organic farming
   - training for farming management practices with a specific environmental protection objective
c) introducing agri-environment schemes that offer area payments to support *"...agricultural production methods designed to protect the environment and to maintain the countryside"* – this is very important tool for supporting the adoption of organic farming, as well other pollution control techniques such as uncultivated buffer strips, conversion of arable to pasture land and the introduction of more diverse crop rotations.

Co-funding will be available for several years for similar measures to be developed and implemented in Romania and Bulgaria under the SAPARD programme – the Special Pre-accession Programme for Agriculture and Rural Development.

Additionally, following agreement on proposals arising from the recent Mid-term Review of the CAP a new "meeting EU standards" measure will be introduced to "*help farmers adapt to the introduction of demanding standards based on EU legislation…concerning the environment, public, animal and plant health, animal welfare and occupational safety*". This is potentially a very useful tool for reducing pollution and some of the acceding countries are proposing to make extensive use of it to improve manure storage and management facilities on farms.

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[21] European Commission (2002). Implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources: Synthesis from year 2000 Member States reports. Report No. COM(2002) 407 final, Brussels, 17.07.2002

Developing the EU Concept of "Cross Compliance"

Following the Mid-term Review of the CAP all Member States will in future be required to issue farmers with a list of "minimum environmental requirements" that must be followed if they want to receive direct support under the new Single Area Payment Scheme.

There are relatively few details available yet, but this will also have to be implemented by the new Member States in the DRB and is a potentially useful tool for reducing certain pollution risks – including from fertilizer and manures.

Another useful tool will be the "verifiable standards of Good Farming Practice (GFP)" that all farmers receiving payments from agri-environment and less-favoured area schemes funded by the Rural Development Regulation must comply with across the whole of their farm[22].

[22] Under Section 9 of EC Regulation No. 1750/1999, which sets out the rules for several measures including agri-environment, it is stated that: *"Usual good farming practice is the standard of farming which a reasonable farmer would follow in the region concerned.....Member states shall set out verifiable standards in their rural development plans. In any case, these standards shall entail compliance with general mandatory environmental requirements."*

Annex 6: Summary of Inventory of Agricultural Pollution Control Policies

Inventory of Policies for Control of Water Pollution by Agriculture in the Central and Lower Danube River Countries: SUMMARY REPORT

Policies for the Control of Agricultural Point and Non-point Sources of Pollution: Output 1.2

September, 2003

Prepared by: Jaroslav Prazan, GFA Terra Systems in co-operation with Avalon

Introduction

The ultimate objective of policy-making for agricultural pollution control is to reduce the risk of point source and non-point source pollution by influencing the behaviour of farmers and to improve the management practices they choose to adopt on a day-to-day basis. In order to understand the way in which policies influence farmers' behaviour (including the adoption of less polluting practices), it is necessary to consider some basic concepts about policy and policy making whereby:

a) governmental agreements at a national and/or international level establish broad *policy frameworks*, and

b) in order to be effective, these policy frameworks encompass three key components - a *policy strategy* (or number of strategies), *policy instruments* and an *implementation structure*.

Policy Strategies

Policy strategies expand upon a general policy framework by specifying:

- more detailed and quantifiable policy objectives, and;
- how these objectives will be pursued.

Since it is rare for one policy instrument to achieve all policy objectives simultaneously, policy strategies usually include the most appropriate combination of policy instruments – the so-called "policy mix" - to achieve optimal pollution control.

Policy Instruments

These are the means or mechanisms by which specific policy objectives are pursued. It is widely acknowledged that the encouragement of more sustainable and environmentally-friendly agriculture commonly depends upon using an appropriate "mix" of three types of policy instruments and measures:

1. **Regulatory Instruments** - these involve the traditional "command and control"-type policy mechanisms, such as statutory prohibitions and legal sanctions, which form the basis of state intervention and control in most developed and developing countries. The principal roles of regulation in agricultural pollution control are to:
   a) prohibit those practices with a high risk of causing unacceptable levels of harmful and polluting substances to be released into the natural environment
   b) establish maximum ceilings or standards for acceptable levels of pollution e.g. drinking water standards for nitrates and pesticides.

2. **Advisory/Informative Instruments** - these are based upon "communication", including the provision of information and advice as well as the opportunity for discussion and negotiation between farmers, policy-makers and other stakeholder groups. Advisory/Informative instruments are particularly important for controlling agricultural pollution because of the need for farmers to use information, management ability and ecological understanding to replace or rationalise the use of agro-chemical inputs and/or other management practices – indeed, sustainable agriculture is often described as *"information intensive, rather than chemical intensive"*.

3. **Economic Instruments** - these involve the use of financial *incentives* and *disincentives* to encourage or discourage the adoption or continuation of specific agricultural practices.

   Financial Incentives

   Financial incentives are potentially very powerful instruments for modifying the behaviour of farmers - they are flexible, easily-targeted and can be linked to the implementation of both regulatory and communicative policy instruments to help achieve specific objectives. Furthermore they are unlikely to require any re-orientation of farmers' attitudes. Examples of financial incentives include compensatory payments, capital grants, credit or low-interest loans, as well as the market advantage

and/or premium prices obtained for certified and labelled products from environmentally-friendly farming systems.

Conventional production subsidies (i.e. financial support payments) to farmers can also be harnessed to environmentally-friendly practices through a system of "environmental cross-compliance". This requires that all farmers who benefit from government support payments must in return undertake specified activities which benefit the environment.

Obviously, the success of the financial incentives outlined above at modifying the behaviour of farmers depends very much upon the ability and willingness of national governments (and ultimately tax-payers) to pay for the environmental benefits that are accrued. However, other incentives can be pursued more directly from the general public as consumers. Environmentally-friendly practices can be encouraged through the adoption of production methods according to prescribed environmental standards or codes of practice which have a strong 'market-linkage'. Accredited products with recognisable labels often have a market advantage and in some cases (e.g. organic food) may attract premium prices which significant numbers of consumers are willing to pay.

Financial Disincentives

Financial disincentives, such as penalties and fines for non-compliance with legislation, are commonly designed *"...to confront the user (or polluter) of the environment with the full economic consequences of his/her actions"* [23]. This approach is derived from the so-called 'Polluter-Pays Principle' whereby those responsible for causing the negative externalities generated by the harmful effects of economic activity upon the environment (mainly, but not exclusively, by pollution) are forced to bear the cost of this damage and/or the costs incurred in controlling the damage.

The "Polluter-Pays Principle" may be applied in agriculture via the government imposition of taxes on fertilisers and pesticides. In theory this means that the external costs of using these agro-chemicals (e.g. cost of water treatment by water supply companies) are 'internalised' to become part of the normal business costs incurred by farmers, thereby encouraging the adoption of less polluting practices/technologies.

Implementation Structure

This is the organisational arrangement within which policy strategies are implemented. The 'actors' within this structure may include farmers and their representatives organisations (e.g. farmers' unions), governmental agencies, sector authorities, private interest groups and even the general public, while their success at implementing policy will depend upon the way in which they organise themselves to solve problems of policy implementation; their degree of power and authority, and; the level of resources they are allocated

The implementation structure will obviously vary depending upon the policy strategies and instruments adopted. For example, regulatory instruments tend to be associated with centralised decision-making and 'top-down' policy implementation. Advisory/informative instruments on the other hand are much more flexible and offer the potential to encourage decentralised decision-making and 'bottom-up' policy implementation by:

a) developing common knowledge and understanding between the policy makers, farmers and/or their representative organisations, and;

b) leaving the final decisions on specific management practices and actions to individual farmers or groups of farmers.

[23] Scheele, M. (1997). The Decomposition Approach: Spatially Differentiated Analysis and Implementation of Environmental Strategies. **In:** *Controlling Mineral Emissions in European Agriculture* (Eds. Romstad, E., Simonsen, J. and Vatn, A.), 41-58. CAB International, Wallingford.

EU Policy and Agricultural Pollution Control in the DRB

This policy review is undertaken during a period of great change in the countries of the central and lower Danube River Basin (DRB) with Hungary, Czech Republic, Slovakia and Slovenia in the final stages of preparation for accession to the EU in 2004, followed by Bulgaria and Romania preparing for EU accession in 2007 or later[24]. The policy-making context for agricultural pollution control in these DRB countries is therefore undergoing significant change and preparation for joining the EU is currently a major driving force for the reform of agricultural pollution control policies in the 6 countries mentioned. This includes the requirement to:

- harmonise national legislation with EU regulatory instruments
- prepare to implement the Common Agricultural Policy (CAP), including rural development measures
- develop the principle of "environmental cross compliance" – in other words, to set certain environmental standards that farmers must meet in order to be eligible for CAP support

Harmonisation of National Legislation with EU Regulatory Instruments

The DRB countries preparing to join the EU have the huge task of harmonising their national legislation with the complex range of EU regulatory instruments.

Table 1 presents a summary of the legislation relevant to reducing the risk and impact of agricultural pollution. It should be noted that some of this legislation has so-far had relatively little impact upon reducing agricultural pollution – for example, the EU Nitrates Directive (No. 91/676) has consistently failed to meet its environmental objectives because of both considerable resistance by the EU agricultural community and poor implementation by many Member States[25].

It is now hoped that the rules of the **Water Framework Directive (No. 2000/60)**[26] will provide a more comprehensive framework for agricultural pollution control, as well as assisting the implementation of existing "single issue" legislation such as the Nitrate Directive. The Water Framework Directive (WFD) was adopted in December 2000 and arises out of a long debate concerning the limitations of existing EU water legislation. The Directive requires that all surface waters (rivers, lakes and coastal waters) and ground waters are managed in order to meet 'good ecological status'. This should be through the use of River Basin Management Plans[27] which will integrate existing EU measures into a programme of basin-specific measures which are appropriate to protecting the local water environment from the human pressures upon it.

There is debate within many Member States on what the implications of the WFD will mean for agriculture - in particular, how the Member States (including the new Member States from the DRB) will use appropriate policy instruments to tackle the significant pressures upon water resources that arise from agriculture, including the risk of pollution. Currently there is much interest in using the policy tools available in the Common Agricultural Policy (CAP) to support and implement the WFD[28] – including agri-environment payments and "environmental cross-compliance" (see below).

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[24] Croatia is also preparing its preliminary application for EU membership

[25] European Commission (2002). Implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources: Synthesis from year 2000 Member States reports. Report No. COM(2002) 407 final, Brussels, 17.07.2002

[26] EC Directive No. 2000/60/EC establishing a framework for Community action in the field of water policy, OJ L327 (22.12.2000)

[27] Bloch, H. (2000). EU policy on nutrients emissions: legislation and implementation. In: *Wastewater and EU-Nutrient Guidelines*, pp 52-59. International Water Association, London.

[28] DG Environment (2003) - Working Document on *The Water Framework Directive (WFD) and tools within the Common Agricultural Policy (CAP) to support its implementation*

Summary Table 1: Summary of EU Legislation Relevant to Agricultural Pollution Control

Title of Legislation	Obligations	Issue
Directive 76/464/EEC on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community	The Directive sets a framework for the elimination of reduction of pollution of inland, coastal and territorial waters by particularly dangerous substances. It identifies 129 dangerous substances and requires Member States to eliminate or reduce pollution by these substances, including a large number of active ingredients used in agricultural pesticides	**Pesticides**
Directive 79/117/EEC prohibiting the placing on the market and use of plant protection products containing certain active ingredients	Directive 79/117 - the 'Prohibition Directive' - bans or restricts the use of pesticides containing certain active ingredients and to ensure that those that are marketed are of a specified quality and appropriately classified, packaged and labelled.	**Pesticides**
Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive)	The Groundwater Directive establishes a framework for the protection of EU groundwater by prohibiting discharge to ground water of the most detrimental substances. It places mandatory obligations on farmers relating to the disposal of pesticide and other farm wastes	**Pesticides** **Point Source Pollution**
Directive 80/778/EEC on the quality of water intended for human consumption (the Drinking Water Directive) – to be replaced by Directive 98/83/EC from 2003	The Drinking Water Directive (80/778) lays down standards for the quality of water intended for drinking or for use in food and drink manufacture in order to protect human health. It does not impact upon farmers directly, but sets maximum admissible pesticide residue levels and maximum admissible concentrations of nitrate in drinking water that water suppliers must comply with.	**Pesticides** **Nutrients (including fertilisers and manures)**
Directive 91/414/EEC concerning the placing of plant protection products on the market	Directive 91/414 - the 'Authorisation Directive' - introduces a Community system to harmonise the authorisation and placing on the market of plant protection products, i.e. pesticides, to protect human health and the environment. It places no mandatory obligations on farmers. The obligation is on the regulatory system to only approve products that pose an acceptable risk to human health and the environment. Detailed criteria and protocols have been devised	**Pesticides**
Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the Water Framework Directive)	The Water Framework Directive (WFD) has the overall environmental objective of achieving 'good water status' throughout the EU by 2010 and for it to be maintained thereafter. It sets out to establish a Community framework for the protection of surface and ground waters across the EU through a common approach, objectives, principals and basic measures based upon the river basin as the primary administrative unit for the purposes of water management. The Directive will have widespread and significant impacts and although it places no direct obligation on farmers, they will have to met certain new standards	**Pesticides** **Nutrients (including fertilisers and manures)** **Point Source Pollution**
Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources	The objectives of the Directive are to ensure that the nitrate concentration in freshwater and groundwater supplies does not exceed the limit of 50 mg NO_3- per litre as imposed by the EU Drinking Water Directive (above) and to control the incidence of eutrophication. The Directive requires individual Member States to develop a Code of Good Agricultural Practice; designate zones vulnerable to pollution by nitrates, and establish and implement Action Programmes within these zones to prevent further nitrate pollution	**Nutrients (including fertilisers and manures)**
Directive 96/61/EC on Integrated Pollution Prevention and Control (IPCC Directive)	This Directive aims to reduce air and water pollution by applying stronger controls to the regulation of emissions from a broad range of industrial activities, including pig and poultry producers. All new or substantially altered pig and poultry units housing more than 750 sows, 2,000 finishers over 30 kg or 40,000 birds will require an operating permit that will detail those practices on the unit that may give to polluting emissions, their environmental impact and the 'Best Available Techniques' required to control emissions.	**Point Source Pollution**

Implementation of the Common Agricultural Policy (CAP), including Rural Development Measures

The main policy instrument for supporting farmers in the EU is the Common Agricultural Policy (CAP). This is a very important policy instrument that continues to undergo a series of radical reforms that will impact upon all farmers in the EU, including those in the new Member States of the DRB.

The first major reform of the CAP was the so-called 'Agenda 2000' proposals which took effect for the period of 2000 – 2006. The Agenda 2000 proposals established a range of rural development measures to the CAP for the first time – the so-called "second pillar" of the CAP as defined by the Rural Development Regulation No. 1257/1999[29]. Amongst other things, this makes provision for Member States to encourage more environmentally-friendly farming methods, including practices that reduce the risk of agricultural pollution, by:

a) offering farmers grant-aided investment (up to 50%) in equipment and facilities that helps to *"...preserve and improve the natural environment"* – for example, by:
   - purchasing up-to-date equipment to spread manure and apply fertilisers or pesticides in a more environmentally-friendly way
   - improving manure storage facilities (e.g. to meet the requirements of the Nitrate Directive)

b) training farmers for the *"...application of production practices compatible with the maintenance and enhancement of the landscape and the protection of the environment"* – this includes:
   - training for organic farming or integrated crop management practices
   - training for farming management practices with a specific environmental protection objective

c) funding national/regional agri-environment schemes that offer payments to farmers to adopt *"...agricultural production methods designed to protect the environment and to maintain the countryside"* – this is very important tool for introducing environmentally-friendly farming methods and includes support for a range of actions contributing to the control of agricultural pollution, including conversion to organic farming.

   EU Member States began implementing the first agri-environment programmes in the 1980s and 1990s, and today such programmes cover over 20% of all agricultural land in the EU. Agri-environment payments are not a subsidy - they are effectively promoting a form of "alternative economic activity" with farmers paid as "environmental managers" in addition to their usual role as food producers.

The potential for agri-environment schemes to contribute to a wide range of rural development objectives, including agricultural pollution control, is recognised by the fact that they are now the **only** compulsory measures for EU Member States to introduce under Regulation 1257/1999. It will therefore be obligatory upon accession for all new Member States to introduce an EU co-financed agri-environment scheme that offers payments per hectare to farmers (for a minimum of 5 years) who voluntarily change their methods of farming in ways to benefit the environment.

Of all the tools of the CAP, agri-environment measures seem the most useful for supporting implementation of the WFD – however, EC rules currently prevent agri-environment payments being made to farmers for complying with the requirements of EC legislation. This is a key issue that needs to be resolved since the resources available for agri-environment measures, including those with a role in controlling diffuse pollution from agriculture, are proposed to increase following the recent "mid-term review" of the CAP[30].

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[29] Council Regulation (EC) No 1257/1999 of 17 May 1999 on support for rural development from the framework, taking account of experience gained using European Agricultural Guidance and Guarantee Fund (EAGGF) and its implementing regulation Commission Regulation (EC) No 445/2002 of 26 February 2002 laying down detailed rules for the application of Council Regulation (EC) No 1257/1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF)

[30] In June 2003, EU agriculture ministers agreed a further package of fundamental reforms following the "Mid-term Review" of the CAP that it is claimed will completely change the way that the EU supports its farm sector. The key elements of the new, reformed CAP that will enter into force during 2004 and 2005 are: i) a single farm

Additionally, the "mid-term review" of the CAP introduces a new "meeting standards" measure that will aim to help farmers adapt to the introduction of EU standards concerning the environment, public, animal and plant health, animal welfare and occupational safety. This may also be useful for promoting pollution control by farmers in the new Member States of the DRB.

While the 4 DRB countries (Czech Republic, Slovakia, Hungary and Slovenia) joining the EU in 2004 will shortly be implementing national agri-environment programmes, 2 DRB countries (Romania and Bulgaria) are unlikely to join the EU until at least 2007. In these latter countries, financial assistance is also available for developing and implementing "pilot" agri-environment measures with SAPARD co-funding – the Special Pre-accession Programme for Agriculture and Rural Development.

Developing the Concept of "Environmental Cross Compliance"

The concept of "environmental cross-compliance" in agriculture (setting conditions which farmers have to meet in order to be eligible for direct government support) has been growing in importance since the 1970s, but was not introduced in the EU until the "Agenda 2000" reforms. This included:

a) allowing Member States, if they chose, to attach environmental conditions to direct payments made to farmers under the 'first pillar' (market support measures) of the CAP

b) requiring Member States to define "verifiable standards of Good Farming Practice (GFP)"[31] that all farmers receiving agri-environment and less-favored payments under the Rural Development Regulation must follow across the whole of their farm. GFP is a relatively new concept to emerge within the EU[32] and its practical implementation is still being tested in many Member States with the interpretation of what constitutes a "reasonable" standard of farming varying from country to country.

There is currently little information available on the implementation of voluntary cross-compliance by Member States, but following the "mid-term review" of the CAP all Member States will in future be **required** to issue farmers with a list of "minimum environmental requirements" that must be followed if they want to receive direct support payments under the Single Area Payment Scheme (SAPS) proposed from 2004.

This will is a potentially useful tool for reducing certain pollution risks – although inevitably the true extent of its influence upon reducing pollution will depend upon Member State's commitment and willingness to fully and effectively implement this new policy instrument

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payment for EU farmers that is independent from production and linked ("cross-compliance") with defined environmental, food safety and animal welfare standards, as well as the requirement to keep all farmland in good agricultural and environmental condition; ii) a strengthened rural development policy with more EU money and measures to promote environmentally-friendly farming methods, as well as a new measure specifically intended to help farmers to meet EU production standards, and; iii) a reduction in direct payments ("modulation") for bigger farms to finance the new rural development policy

[31] Under Section 9 of EC Regulation No. 1750/1999, which sets out the rules for several measures including agri-environment, it is stated that: *"Usual good farming practice is the standard of farming which a reasonable farmer would follow in the region concerned.....Member states shall set out verifiable standards in their rural development plans. In any case, these standards shall entail compliance with general mandatory environmental requirements."*

[32] It should be noted that GFP is **not** equivalent to the Code of Good Agricultural Practice (CoGAP) that Member States must introduce in accordance with the requirements of the EU Nitrates Directive 676/91.

Aims of the Report and Approach Taken

The purpose of this review is to develop understanding of the existing policy context regarding agricultural pollution control in the 11 central and lower DRB countries supported by the UNDP/GEF Danube Regional Project. In particular, the review aims to **classify**, **describe** and **analyse** 4 key issues:

1. The **current policy objectives** and **strategies** of the different Danube River Basin (DRB) countries regarding the control of water pollution caused by agriculture
2. The various policy instruments and practical measures that are currently used in the DRB countries in order to promote the control of water pollution caused by agriculture (e.g. to implement national policy objectives) where:
   - **policy instruments** set the framework for changing agricultural practice (e.g. a *Governmental Act for Soil and Water Protection*)
   - **practical measures** are the day-to-day farm management practices that need encouraging at farm level e.g. the prohibition of all fertiliser and manure application in water protection zones or limits on quantity of total fertiliser nitrogen application in all areas, etc.
3. The **overall effectiveness of the "policy mix"** used to control water pollution caused by agriculture – this includes the effectiveness of the policy instruments and practical measures being implemented – do they match the main water pollution problems (nutrients, farm wastes, pesticides and soil erosion)? Do they target all necessary enterprises? Are there any gaps in implementation? What is the level of enforcement? Etc.
4. The effectiveness of the **institutional arrangements** that are operating to implement the various policy instrument and measures - are the institutions effectively organised to implement policies and practice for agricultural pollution control? Do the relevant institutions have appropriate power and authority? Are sufficient resources allocated to the relevant institutions?

Methodology

In order to collect relevant information about current agricultural pollution control policies and the level of their implementation, a questionnaire survey was designed and then undertaken by the GFA national experts working in each country of the 11 DRB countries under study.

The main types of measures were investigated - regulatory, economic and advisory/informative – as well as Project-Based instruments and measures since in some countries the agencies most actively working on agricultural pollution control are often operating outside of national policy-making activities and are working instead with some other form of alternative assistance (e.g. from an international donor) within the framework of a project.

Additional specific questions were asked about the institutional (organisational) arrangements for each of the instruments implemented, plus an evaluation of policy mix with special attention to the targeting of policies and any reasons reason for poor implementation.

The information gathered were analysed in order to draw recommendations for policy reform. All the detailed and country specific data are available in Annexes to the main report.

Summary of the Current Status of Agricultural Pollution Control Policies in the Central and Lower DRB Countries

One of the key driving forces for policy reform in the area of agricultural pollution control is preparation for joining the EU. The countries reviewed currently fall into 3 groups relating to their status towards EU accession and different stages of policy design and implementation:

EU Acceding Countries – entering in 2004: Czech Republic, Hungary, Slovakia and Slovenia.

EU Candidate Countries – entering after 2004: Bulgaria and Romania.

Non-EU Accession Countries: Croatia (preparing application to join EU), Bosnia and Herzegovina, Moldova, Serbia and Montenegro, and Ukraine.

The following summary of policy survey results is organised according to these groups of countries – the relevant summary tables are included at the back of this summary report.

Existence of Strategies for Agricultural Pollution Control

All national experts reported some goals for water protection in their countries but only Slovakia was reported to have already adopted a "water protection strategy". Most countries in the central and lower DRB are therefore lacking a clear, targeted and overall strategy for water protection that integrates different policy measures and shows the necessary path to the achievement of indicated goals.

Most progress towards the development of water protection strategies is made in those countries preparing for EU accession in 2004, but in some of the other DRB countries there remains concern that agriculture is still not identified as an important source of water pollution.

Regulatory Frameworks for Agricultural Pollution Control

EU Acceding Countries	All countries are reported to be addressing the major agricultural pollution issues (nutrients, pesticides, farm waste and erosion) with a range of regulatory instruments. These instruments are increasingly specific to the regulation of farming practice rather than general water protection – consequently these countries now have targeted regulations controlling undesirable farming activities plus the potential to fulfill their role in water protection if successfully enforced.
EU Candidate Countries	It was reported from Bulgaria and Romania that not all of the main agricultural pollution issues are addressed by existing regulatory instruments. Existing instruments still tend to be rather general, with fewer specific regulatory instruments in place. Consequently there is still potential to prepare more targeted instruments to prevent water pollution through the control of specific farming practices.
Non-EU Accession Countries	Again it was reported that not all agricultural pollution issues are addressed by existing regulatory instruments. In these countries there is a noticeable lack (with the exception of Croatia) of specific and targeted regulatory instruments for controlling water pollution by agriculture. In some countries this appears due to the fact that agriculture is still not identified as an important source of water pollution – consequently the available legislation is too general to effectively control polluting activities by farmers

Use of Economic Instruments and Measures for Agricultural Pollution Control

Economic instruments may be incentives (farmers are financially rewarded for some activities undertaken) and/or disincentives (farmers are penalized for certain activities causing pollution) and can be used as a fundamental tool for modifying the management practices of farmers and reducing agricultural pollution. However, effective measures (or mixes of measures) need to be well-designed and balanced – as well as successfully implemented. Not surprisingly, the economic instruments used in the countries under study are predominantly disincentives due to the lack of financial resources to imtroduce incentive schemes. Furthermore, the economic instruments which are in place do not currently all pollution issues in all countries (notably HR, BH, HU and RO) – for example, Romania has no economic instruments in force at present which relate to soil erosion.

Note: even in countries with lack of encouraging instruments when the rest of the instruments are well enforced significant achievements in water pollution prevention can be reached.

EU Acceding Countries	These countries are reported each to have 2-5 incentive measures in place and an equal or higher number of disincentive measures. The number of incentive measures is expected to increase in 2004 with EU accession and the availability of EU co-financing for rural development measures such as agri-environment programmes. If these measures are well implemented there is great potential for effective water pollution prevention (this should mitigate to some extent against the risk of increasing pressure upon water quality due to expansion of the CAP in the central DRB.
EU Candidate Countries	Bulgaria and Romania have so-far only designed implemented a small number of disincentive measures, but there are even fewer incentive schemes (1 in Bulgaria). This situation should change rapidly with the introduction of SAPARD-funded pilot agri-environment projects and continuing preparation for EU accession after 2004.
Non-EU Accession Countries	Countries in this group were reported to have implemented a larger number of disincentive measures, but still relatively few incentive measures. Although there is considerable potential for the introduction of further incentive schemes, this is likely to be limited by prevailing economic circumstances.

Use of Advisory/Information Instruments and Measures for Agricultural Pollution Control

The transfer of knowledge and information to farmers via advisory/informative instruments can play a key role in modifying the management practices of farmers and reducing agricultural pollution. The national experts were given a list of 8 types of this measure and asked to recognized how many of them are implemented in their country. The types of measure were:

- Technical assistance by independent advisory service
- Technical assistance by State advisory service
- Technical assistance by providers of farm inputs
- Education and awareness-raising campaigns
- Demonstration farms
- Learning by sharing of ideas among the farmers
- Publications and other information materials
- Training

All experts reported that the most frequent limitation upon this type of instrument was that actions were too small with insufficient staff and financial resources. In some countries not all water pollution issues are addressed by information measures (BG, HR, HU, RO, SI and SI).

EU Acceding Countries	Here 5,5 instruments are in average used in these countries and there is still large potential in further development of them
EU Candidate Countries	Countries entering EU later have in average 4 instruments implemented and have large potential in further design and implementation too.
Non-EU Accession Countries	Experts in these countries are reporting in average 6 instruments per country.

Project-based Instruments and Measures for Agricultural Pollution Control

Various types and size of the project targeted to water pollution from agricultural resources prevention do not allow precise assessment of their potential impact and quality of implementation. In addition only those projects were taken into account which targeted only to DRB. Results are therefore indicating tendencies in countries in question.

EU Acceding Countries	Experts reported there is an average 4,5 projects per country. Projects are mostly targeted to research and policy design/implementation support.
EU Candidate Countries	In Romania and Bulgaria there are in average 3,5 projects per country Some of these projects are large scale (more than 1 MIO EURO) and internationally supported.
Non-EU Accession Countries	In these countries there have been indicated 6,4 projects per country. The most projects are reported from Croatia (24), but from in the rest of the countries targeted projects are rare.

Effectiveness of the "Policy Mix"

All of the policy measures mentioned above were represented in matrix (Summary Table 1) creating broad picture about policies intended for reduction of agricultural water pollution. There are differences in number of on-farm practical measures addressed and effectiveness in reduction of pollution. This number is only indicative because of potential differences of on-farm practices definitions.

When assessing effectiveness in reducing pollution national experts were asked to make subjective scoring (1 = most effective, 3 = not effective at all).

EU Acceding Countries

National reports brought evidence about practical on-farm measures targeted by various policies. In this group of countries there has been in average 10 practical measures (average per country) addressed by policies.

Mostly mentioned on-farm practical measures:

- Manure and fertiliser storage,
- Nutrient management,
- Grassland conversion to arable land should be permitted,
- Discharge is possible after permit is given,

- Pesticides storage and use,
- Waste management (plans),
- Action plan for NVZs
- Limits to pesticides and fertiliser use in water protected zones,
- Organic farming,
- Erosion prevention,
- Machinery approval (for pesticides application),
- Arable conversion to grassland,
- Buffer strips along the streams,
- Limited drainage and irrigation,
- Wetland/grassland management,
- Limits of airplane agrochemicals application.

Even these countries are using most on-farm measures there is still potential for new measures design and implementation. Average score for effectiveness of measures assessed in policy matrix was 1,9 in this group (average per country). The number of the measures promoted is highest it is expected the number will grow during next years after EU accession and growths of effectiveness is needed too.

EU Candidate Countries

The average number of on-farm measures in countries concerned is 5,5 (average per country). These are:

- Manure and fertiliser storage,
- Pesticides storage and use,
- Waste storage (close to water),
- Limits to pesticides and fertiliser use in water protected zones,
- Destroying of buffer strips along the streams is prohibited,
- Grazing of animals close to waters is limited,
- It is prohibited to issue waste to waters and washing in waters.

These countries have still potential for design additional practical on-farm measures targeted into water pollution prevention. Average score for measures effectiveness evaluation was for this group of countries 2,3. Low number of measures and low score of effectiveness show the policies needs improvement in design and implementation too. The improvements could be expected during EU accession process in following years.

Non-EU Accession Countries

Average number of practical on-farm measures is 4,8 per country. The most frequently mentioned measures are:

- Manure and fertiliser storage,
- Strip cropping,
- Conservation tillage,
- Crop rotation,
- Grassland conversion to arable land,
- Pesticides use,
- No development of farming in sensitive areas,
- Limits to pesticides and fertiliser use in water protected zones,
- Organic farming,

- Erosion prevention,
- Green cover,
- Strip cropping,
- Terraces creation,
- Sensitive grazing.

Most of the countries in this group do not promote enough the potential conservation farm practices by relevant policies. Average score expressing evaluation of effectiveness of the measures in the policy matrix is 1,9. For interpretation of this index it is necessary to note one expert did not indicated any on-farm measure in the country and these countries usually do not have the measures widely spread. The average number of measures per country is too small to implicate effective policy as a whole in these countries (S-M influenced the average of effectiveness score in a positive way significantly).

Deficiencies in Policy Development and Implementation

The policies were implemented in DRB countries with various level of success. It is evident even well designed policy when not properly implemented it could have very low effectiveness in achieving of its goals. The experts have been questioned about reasons for not proper implementation.

EU Acceding Countries

The main reasons for lack in implementation in this group of countries are:

- Policies are not targeted to prevention enough.
- Lack of coordination in policies (on ministerial level).
- Lack of financial and human resources (not enough trained staff, financial resources to support farmers etc.).
- Enforcement is difficult in case the compliance is costly to farmers (investment to manure storage facilities etc.).
- Pesticides application is not checked.
- Lack in targeting.
- Not efficient management in policies implementation.
- Water pollution issues are not regarded as urgent issue.
- Poorly defined responsibilities.
- Poor control.
- Low farmers awareness.
- Too strict rules for administration.

EU Candidate Countries

Bulgaria and Romania national experts indicated following reasons for poor implementation:

- Lack of coordination among ministries.
- Lack of staff.
- Lack of control.
- Lack of coherent action plan.
- Decision-making is blocked (no integration).
- Too general legislation.

The total number of lacking factors in implementation is influenced by number of countries in question too.

Non-EU Accession Countries

National experts in the last group of countries reported following reasons for lack in implementation of policies:

- Lack of trained staff.
- Not enough publications and/or information campaigns.
- No demonstration farms.
- Lack of financial resources.
- Poor organisation and management.
- Poor cooperation with NGOs.
- Lack of policy-making experience.
- Lack of cooperation with public administration.
- Not present legislative body in charge of agricultural pollution.
- Law not in force but administration designed according to the law (lack of coordination).
- Isolation from international cooperation.
- Lack of coordination among ministries (up to 6 ministries involved in water protection per country).
- Some relevant regulations (especially specific) were not designed yet or existing are too general.
- The water protection is not recognised as an issue last 10 years.
- Farmers do not believe they are cause pollution of water pollution.
- Not enough frequent compliance check.
- Not enough enforcement (fines are low and in some countries even not collected etc.).
- No systematic approach to campaigns – awareness rising.
- Not sufficient information flow.
- No/poor facilities providing education/advice like: demonstration farms, not enough publications and courses, advice is concentrated more to production and economics.
- Lack of trained advisors.
- Lack of experiences.

There are numerous factors in common when summarising weaknesses of the policies under discussion in lower DRB countries (for example lack of financial resources, lack in education, dissemination etc.). The difference is mainly in the extent to which the policy are designed and implemented.

Situation Regarding the Promotion of Good Agricultural/Farming Practice

Definition and Promotion of Good Practice

When applied to agriculture, the term Good Practice is usually assumed to be the minimum level of environmental management practice that it is "reasonable" to expect a farmer to undertake as part of "usual" farm management and without expecting any form of compensation/financial assistance. There are usually significant variations in the way that this is defined in different countries, but it generally includes respect for environmental legislation, following advice from extension services, taking into account scientific and technical progress etc.

In EU Member States, Good Practice is most commonly communicated to farmers either as:

- **free-of-charge as advisory publications** which are often distributed with an accompanying information campaign, or
- **Codes** or **Standards** – in particular, the preparation of Codes of Good Agricultural Practice for the Protection of Water is an obligation for Member States under the EC Nitrate Directive 91/676 and verifiable standards of Good Farming Practice (GFP) are required according to the Rural Development Regulation 1257/1999.

Therefore the DRB countries which are most advanced in the definition and promotion of Good Practice are those preparing for EU accession in 2004 (CZ, HU, SK and SI).

For example, all of these countries are in the process of finalising draft Rural Development Plans for implementation during 2004-2006 which contain (in various stages of development) verifiable standards of GFP as a baseline for agri-environmental measures and Less Favoured Area (LFA) payments. Similar verifiable standards are being developed in Bulgaria and Romania for implementation of "pilot" agri-environment measures under SAPARD.

The approach to the design of GFP standards varies greatly among the 6 DRB countries preparing for EU accession – the most common approach being simply to base verifiable standards upon existing environmental legislation. For example, in Bulgaria GFP is based upon existing environmental legislation, but also includes reference to additional recommendations taken from the voluntary code of good agricultural practice for the protection of water that is under development. Verifiable standards concerning water protection include the prohibition of storing or disposing of pesticides and constructing of cattle shed or manure storage within 20 m of a river bank, stream, lake, water reservoir or seashore. After consultation with the EU Commission it was also necessary to include limits on stocking densities for animals and the level of fertiliser application according to crop.

In most other DRB countries, the national experts reported awareness of the concept of good agricultural practice amongst policy-makers and an interest in promoting it to farmers. However, the biggest problems remain:

a) the lack of resources for preparation of information materials and appropriate awareness-raising campaigns
b) the lack of understanding and capacity amongst extension services for promoting good practice, and;
c) the tendency for innovative ideas and approaches concerning good practice to remain "locked" within projects without the possibility of effective dissemination

Conclusions and Recommendations for Policy Reform

All national experts reported their countries have great difficulties with implementation especially because administration capacities are growing slowly and there has not been sufficient time and sometime even political conditions to mature in enforcement of policies.

If we compare number of measures in each type of policies it is clear regulative measures are most frequent and rest of the policies are less employed in water pollution prevention (especially education/information measures and rewarding economic measures are lacking).

Some countries are at that stage they even need start first with explanation on national level that there are issues to be solved in agricultural water pollution.

Most of agricultural water pollution issues were addressed in policies in all countries but these should be covered all. The differences among countries were more in targeting (detailed or general) and in addition slightly more attention was paid to direct water pollution than to soil pollution.

Above described policies and implementation institutional arrangements show there are several areas for action.

Recommendations

All countries:

- To design strategies addressing separately each pollution issue.
- To improve enforcement of relevant policies (compliance check, penalties system etc.).
- To design and implement information/education measures.
- To promote more organic farming.
- To design and implement documents falling into cross-compliance concept (GFP etc.)
- Create sufficient budget for the policies (in order to promote BAP).
- Increase of farmers and advisors awareness (including public).
- To start capacity building for administration (precondition of better enforcement - control, proper penalty system, trained staff etc.).

Countries accessing EU in 2004:

- To improve targeting (aimed in prevention), enforcement and implementation of all policies.
- Better describe/share responsibilities among actors.

Candidate Countries and other Countries:

- To complete legislation instruments to create necessary legislative framework and especially to design specific and targeted legislation.
- Design more balanced policies by increasing of importance of economic and educational/informational measures and increase the budget for those measures.
- To cover all key issues in water pollution from agricultural sources into policy tool.
- To facilitate growth of administrations´ needed experiences with policy making and implementing.

Future Policies

Countries in accession to EU (Czech Republic, Hungary, Slovakia, Slovenia) are preparing numerous measures dealing with water pollution prevention and it is quite sure most of them are not mentioned in this report, because these are not agreed yet. It would be useful to repeat some of the questions at the beginning of 2004. The reason is these countries are in budgetary constraints, which could reduce the real scope of some policies implemented (especially agri-environmental schemes could be finally implemented in limited number).

The survey showed there are apparent gaps in policies and in general knowledge of the issues. While transfer of knowledge is not usually associated with difficulties, "export" of policies expecting efficient operation of the measures brings a lot of obstacles. Result of the survey discovered some of them and some of them are still hidden and should be identified later during designing the policies and implementation process.

Annex 7: Draft BAP Concept Paper

"Best Agricultural Practice" (BAP) for the Central and Lower Danube River Countries: DRAFT CONCEPT

Policies for the Control of Agricultural Point and Non-point Sources of Pollution: Output 1.2

September, 2003

Prepared by: Dr Mark Redman, GFA Terra Systems in co-operation with Avalon

Introduction

The overall aim of the Danube Regional Project (DRP) is to support the activities of the International Commission for Protection of the Danube River (ICPDR) in implementing a regional approach in the 11 countries of the central and lower Danube River Basin to solving the trans-boundary problems associated with the protection of the Danube River - including the sustainable management of natural resources, reduction of water pollution and protection of biodiversity.

Objective 1 of the DRP is the creation of sustainable ecological conditions for land use and water management. Under this objective there are two key outputs relating to agriculture, of which **Output 1.2** is concerned with the *reduction of nutrients and other harmful substances from agricultural point source and non-point sources through agricultural policy changes.* One of the main focuses of Output 1.2 is to support the greater integration of pollution control considerations into the day-to-day management of crops, animals and land by farmers through the promotion of "best agricultural practice" (BAP).

Good/Best Practices for Agriculture

Good/best practices for agriculture have been under development for many years and in many different countries in response to the concerns of a wide-range of stakeholders about many different issues, including food production methods, food safety and quality, and the environmental impact of agriculture. Stakeholders involved in the development of good/best practices typically include governmental and non-governmental organisations, farmers, consumers, food processors and retailers etc. – all of who seek to meet a variety of objectives for food quality, production efficiency, rural livelihoods and environmental benefits. The definition of good/best practices offers a means for these different stakeholders to promote their objectives within a clear framework that communicates the best available knowledge on a particular issue or issues. For example, a growing number food processors and retailers increasingly require farmers to follow Codes of Practice for the production of fresh fruit and vegetables, cereal crops and livestock in order to achieve their required standards for quality assurance, consumer satisfaction and profit.

Minimum Environmental Standards

The general concept of good/best practice is also an increasingly important part of introducing and maintaining minimum environmental standards as the basis of promoting more sustainable agricultural systems. Environmental standards are, for example, becoming a key part of the European model of agriculture due to international trade agreements, public environmental concerns and market forces, and are likely to play a significant role in future agriculture policy. Such standards are necessary to ensure minimum environmental protection on farmland and comparable production conditions (preventing uneven competition) across Europe. Different countries implement such minimum environmental standards in various ways using a variety of different policy measures and instruments, but conceptually there are three main levels of environmental performance in agriculture that relate to good/best practice:

"Red Zone"	These are the practices by farmers that are considered unacceptable and therefore commonly prohibited by law to protect natural resources, human health etc.
"Blue Zone"	This includes the minimum level of environmental management that it is considered "reasonable" to expect a farmer to undertake as part of "usual" farm management and without expecting any form of compensation/financial assistance. There are likely to be significant variations in the way that "good practice" is defined in different countries, but it is likely to include respect for environmental legislation (i.e. avoidance of the "red zone"), following advice from extension services, taking into account scientific and technical progress etc.
"Green Zone"	This involves a higher level of level of environmental management practice that delivers greater environmental benefit, but usually at greater "cost" to the farmer which may require some form of compensatory payment

Context

A significant proportion of the nutrients (nitrogen and phosphorus) that are discharged in the ground and surface waters of the Danube river catchment come from agriculture. Additionally, the majority of pesticides detected in water resources in the DRB catchment also come from agricultural non-point sources.

The objective of developing a concept of "best agricultural practice" (BAP) under Output 1.2 is to support the design of new agricultural pollution control policies for the central and lower DRB countries – as well as encouraging compliance with existing and emerging national legislation (including that driven in many countries by the process of EU accession) – that will promote the greater integration of pollution control considerations into the day-to-day management of crops, animals and agricultural land by farmers in the central and lower DRB.

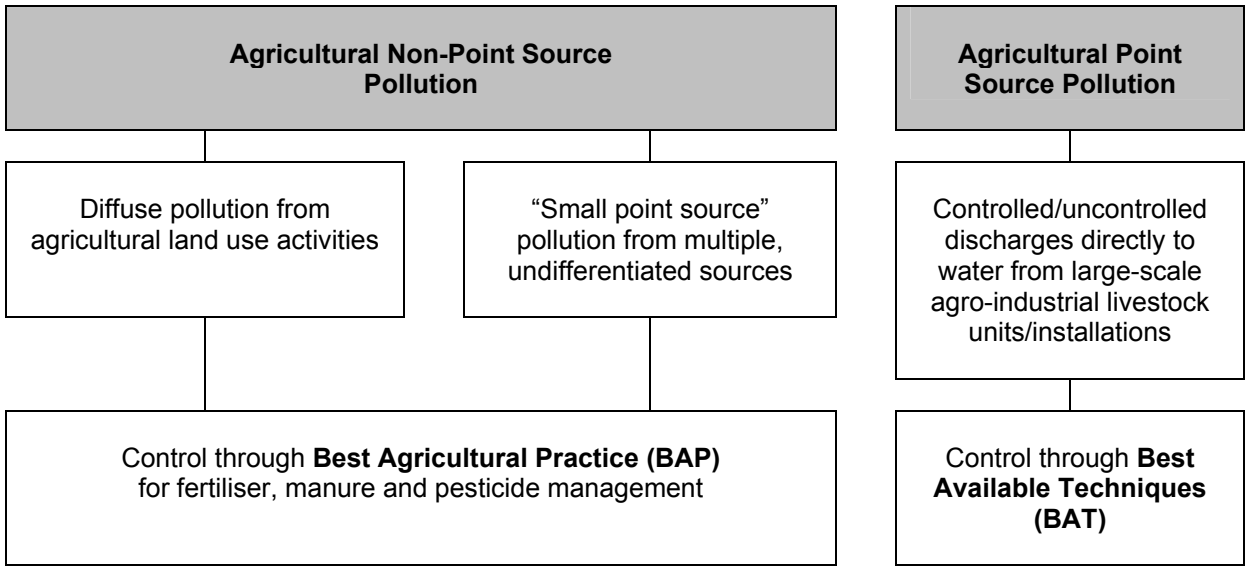
For the purposes of this project, the term "best agricultural practice" (BAP) is used only to describe farm management practices that reduce the risk of pollution occurring from **agricultural non-point sources** in the DRB – this includes:

1. **diffuse pollution** occurring as a result of agricultural land-use activities (e.g. application of mineral fertilisers, manure and pesticides) that are dispersed across a catchment or sub-catchment with no single discrete source
2. **"small point source" pollution** arising from multiple, small-scale (and often accidental) discharges that occur from the many different farming activities that are also dispersed across a catchment or sub-catchment (e.g. effluent leakage from small-scale livestock farming, poor disposal of pesticides, run-off of manure from sloping land etc.)

Agricultural point source pollution on the other hand arises from single, discrete sources which are commonly associated with large-scale animal production units/installations that are regulated by discharge consent or control.

Because of the industrial nature of these larger livestock units - plus the argument about whether they should actually be classified as "industrial" emissions – it seems appropriate to refer to these farms as "agro-industrial units" (defined according to criteria based on number of animals) and therefore to also refer to **agro-industrial point source pollution**.

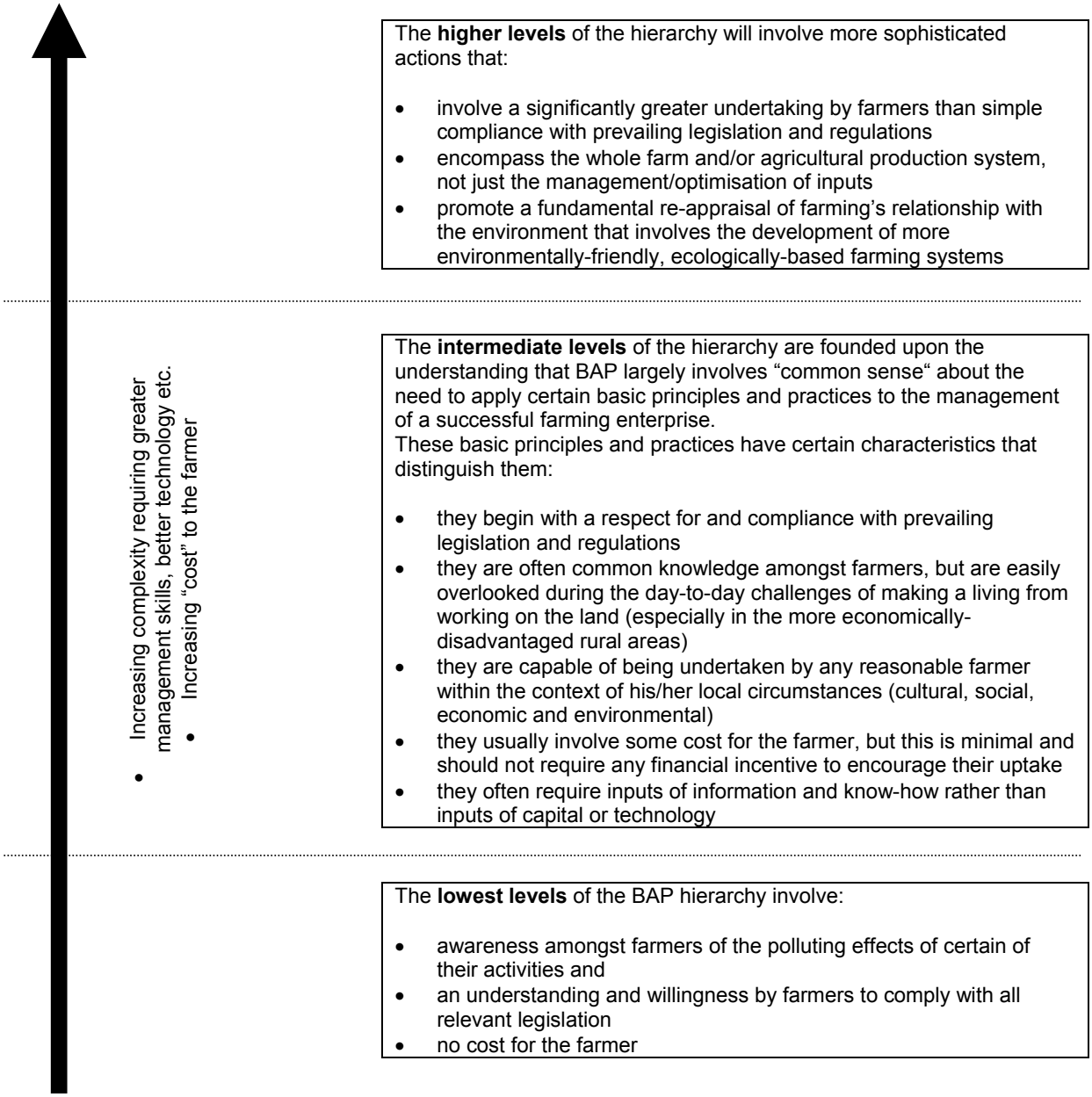
The management practices used to control pollution from such units/installations are commonly referred to as "best available techniques" (BAT) rather than "best agricultural practice" (BAP). These differences can be summarised as follows:



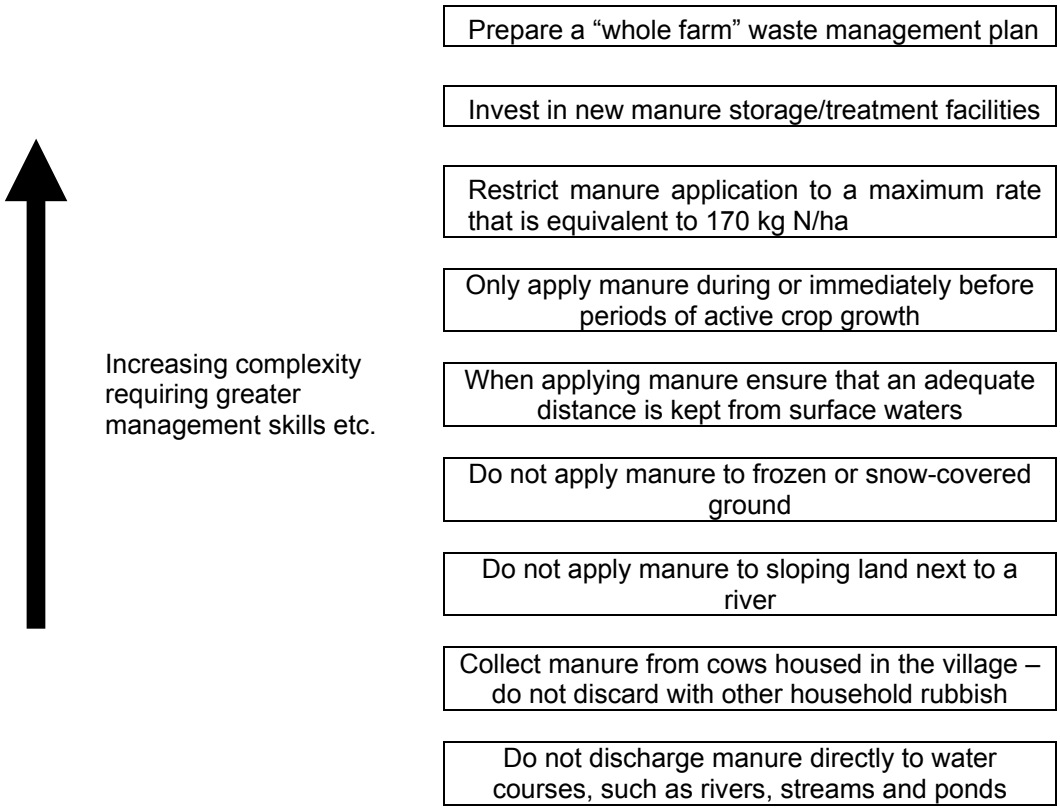
Developing the BAP Concept

There are no concrete and universal definitions available for what is or is not best agricultural practice – indeed, there is a risk that it is a potentially confusing term because it is so prone to being interpreted by different people in many different ways. For example, in the context of the DRB it is important to clearly distinguish between the concept of BAP and the existing EU concepts of *Codes of Good Agricultural Practice* (under the EC Nitrate Directive) and verifiable standards of *Good Farming Practice* (under the EC Rural Development Regulation, 1257/1999).

A strict or prescriptive definition of BAP for Output 1.2 has therefore been avoided in this project – instead we have proceeded with the understanding that BAP actually encompasses a broad spectrum or **hierarchy of activities** that must be interpreted according to local agronomic, environmental, social and economic context. It is this hierarchy of activities that could form a clear and common concept for BAP throughout the DRB countries as follows:



For example, the following simple hierarchy relating to BAP for the collection, storage and application of manure can be developed:



Obviously not all elements of this hierarchy are relevant in all countries of the central and lower DRB – there has to be some interpretation according to local context. To be effective, any BAP must not only be technically and eonomically feasible, it must also be socially acceptable to the farming community. For example, the social and economic circumstances of many rural communities in Moldova are very difficult and this will inevitably limit the ability of farmers to adopt the full BAP hierarchy above – indeed, even basic action such as ensuring that manure is collected and returned to the land rather than discarded in the village rubbish dump with other household waste can be difficult to encourage when local farmers cannot afford the cost of transporting manure to their fields.

On the other hand, in the Czech Republic we might expect the more commercially-orientated farmers there to have the willingness and ability to prepare a "whole farm waste management plan" and make the necessary calculations for restricting manure application to specified, matching fertiliser use to soil N supply etc. When viewed like this, Best Agricultural Practice is quite straightforward and easy to define as:

> **"…the highest level of pollution control practice that any farmer can reasonably be expected to adopt when working within their own national, regional and/or local context in the Danube River Basin"**

As such, BAP can be applied as a uniform concept across the whole DRB, but the level of environmental management/performance that we can expect from farmers in different regions/countries will vary significantly according to:

a) the agronomic, environmental and socio-economic context in which they are operating
b) the availability of appropriate policy instruments for encouraging farmers to "move up" the hierarchy and adopt more demanding pollution control practices
c) the availability of appropriate knowledge and other technical resources for supporting farmers to "move up" the hierarchy and adopt more demanding pollution control practices

Policy Instruments and Measures for Promoting BAP

As implied above, the objective of policy strategies for agricultural pollution control in the different DRB countries should therefore be to encourage farmers to "move up" the BAP hierarchy as far as possible in the context in which they operate and deliver the highest level of pollution control that it is feasible for them to do. The function of available policy instruments and measures for achieving this "shift" can be summarised as follows:

a) **Disincentives** for dropping below the minimum level of environmental management practice that is acceptable – in other words, to avoid as many farmers as possible from staying in or entering the "red zone" of environmental performance

b) **Appropriate interventions** for promoting and sustaining the minimum level of environmental management practice (the "blue zone") on as many farms as possible, and

c) **Incentives** to go beyond the minimum level of environmental management practice and deliver a higher level of environmental performance – in other words, to encourage farmers improve their management practices still further and enter the "green zone"

Obviously the pursuit of such strategies will require a combination of policy instruments – the so-called "policy mix" - to achieve optimal pollution control and a number of additional factors will influence the selection of these instruments, including environmental effectiveness, economic efficiency, equity and accessibility to farmers, administrative feasibility and cost, and political acceptability.

Figure 1 gives a hypothetical example for the "mix" of policy tools for might be used for promoting different elements of BAP associated with the collection, storage and management of manure.

Table 1 summarises the actual "mix" of policy instruments (2002) used in the United Kingdom for controlling diffuse pollution from agriculture – note the extensive use of advisory instruments

Some Lessons to be Learnt

1. The introduction of new regulations for the control of agricultural pollution often requires the re-orientation of traditional attitudes within the farming community in order to accept the new *"moral authority"* (sanctions and controls) being imposed upon their businesses. All new regulations should be introduced in combination with appropriate information and advice
2. The implementation of pollution control measures at the farm level will only be successful and sustainable if the farmer can determine that it is in his/her economic interest to undertake such measures. For example, farmers are often advised that the use of an alternative practice is not only better for the environment, but can also save on agrochemical inputs and therefore improve the profitability of their farm businesses. These economic benefits must be clearly identified to the farmer and may involve a "creative approach" to the economics of farming practices
3. Capital grants normally involve one-off payments for investment in specific tasks or facilities (e.g. waste handling and storage) that have environmental benefits. However, unless grant rates are 100% (i.e. none of the cost is shared by the farmers) their uptake can be limited by the reluctance of farmers to meet the additional costs over and above the grant – under these circumstances it is also important to identify the economic benefits to the farmer
4. Large amounts of money can be wasted on poorly designed information campaigns for agricultural pollution control – information materials must be well-written and attractively presented with clear and simple advisory messages.
5. Environmental policy strategies and their implementation structures should be developed with a view towards minimising as much as possible the public costs of administration, monitoring and enforcement. One low-cost approach to implementing environmental policy which is increasingly favoured in some countries is the government funding of voluntary and community assistance programmes to build the 'capacity' of local people to address local environmental problems with locally-developed solutions.

Figure 1: Hypothetical Example of the "Mix" of Policy Tools used to Promote Best Agricultural Practice for the Management of Manure

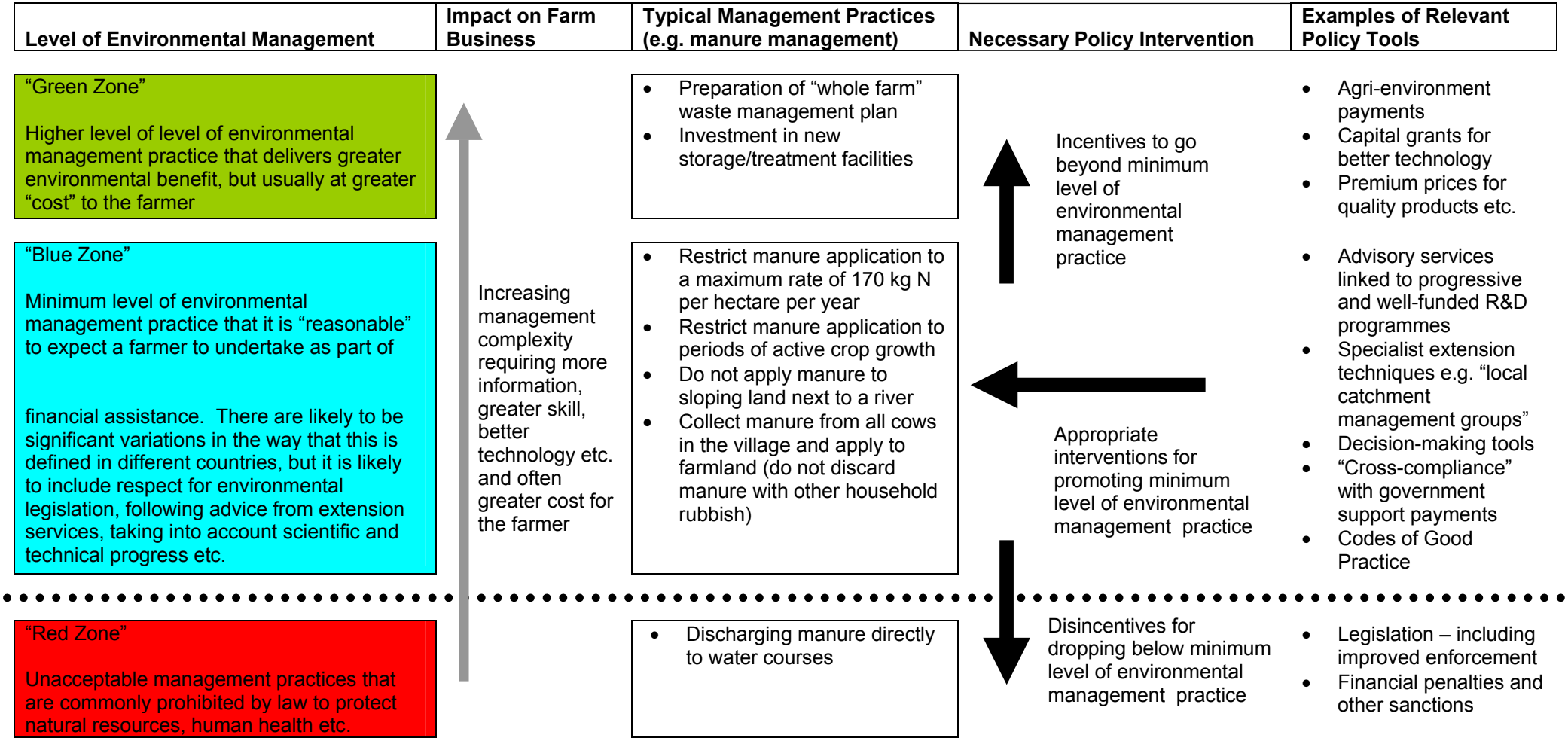


Table 1: Summary of the "Mix" of Policy Instruments used in the UK in 2002 for Controlling Diffuse Pollution from Agriculture

	Disincentives for Dropping Below Minimum Level of Environmental Management
Advisory Instruments	• **On-farm Advice** - Environment Agency provides advisory support to farmers in high risk areas to promote awareness of pollution control legislation and the likely cost of non-compliance
Economic Instruments	• **Enforcement Fines** - Environment Agency imposes fines (up to 30,000 EURO) on farmers prosecuted for causing water pollution
Regulatory Instruments	• **Regulatory Controls** – numerous national legislation regulating agricultural emissions, activities, technologies and substances in relation to water pollution. Key items of EU legislation transposed into national legislation include: *Nitrates Directive*, *IPPC Directive*, *Groundwater Directive*, *Environmental Impact Assessment Directive*, *Sewage Sludge Directive* and preparations for the *Water Framework Directive*

	Interventions to Promote Minimum Level of Environmental Management
Advisory Instruments	• **On-farm Advice** – a variety of on-farm advice is currently provided free of charge, including advice on farm waste management plans within selected river catchments and advice on nutrient planning to farms going through organic conversion • **Codes of Good Agricultural Practice –** these are aimed at the protection of soil, water and air. They are designed to help farmers avoid causing pollution from different agricultural sources and include a range of advice and information that is specifically relevant to the control of diffuse pollution from agriculture • **Other Written Advice -** various advice booklets on the subject of nutrient and waste management, including regularly updated fertilizer recommendations for all crops • **Training -** a vocational training scheme for land managers offering part-funding for courses provided by approved trainers, exchange visits, etc. • **Decision tools -** a number of decision tools have been developed to help farmers with different aspects of nutrient management (e.g. fertiliser application rates, N availability in manures, etc.). • **Promote/facilitate information exchange between farmers –** the Government facilitates exchange of information through demonstration farms (e.g. there are four that are used to promote better manure management) and sponsorship of local workshops etc. • **Local diffuse pollution initiatives -** a number of local advisory and awareness-raising initiatives have operated in areas where diffuse pollution is a problem. These initiatives adopt a participatory/partnership approach, focus on local issues, and integrate a range of advisory approaches (awareness-raising, information exchange, demonstrating best practice, offering on-farm advice) • **Research & Development –** the Government sponsors scientific research into diffuse pollution and nutrient management as policy and information needs arise
Economic Instruments	• **Grant Scheme** - farmers within Nitrate Vulnerable Zones are eligible for a "farm waste capital grant" to meet the costs of complying with regulatory requirements • **Cross Compliance** – farmers receiving agri-environment and LFA payments must follow verifiable standards of Good Farming Practice on their whole farm – these which include some reference to manure management • **Product labelling/environmental branding -** a number of quality assurance schemes exist for different types of farming. These include some environmental requirements and give farmers some market advantage, particularly with the large multiple retailers

	Incentives to go Above Minimum Level of Environmental Management
Economic Instruments	1. **Agri-environment Payments** – some agri-environment schemes promote landscape and biodiversity features (e.g. conversion of arable land to permanent pasture) that have benefits for reducing diffuse pollution

Annex 8: Workshop Evaluation

(handed out to all participants – **29 sheets returned)**

Workshop title	**Workshop on "Promoting Best Agricultural Practise in the Danube River Basin (DRB)"**						
Date of workshop	**from 6 to 7 October 2003 in Zagreb (HR)**						
How long before the workshop start did you receive the invitation?	**4.27 (1 – 10**) weeks						
With the invitation, did you receive the agenda and the objectives?	agenda **24** yes **3** no objectives **26** yes **2** no background material **14** yes **10** no						
Were the objectives spelled out at the beginning of the workshop?	**28** yes 0 no						
Did the workshop fully meet its predefined objectives?	**21** yes **8** partly no						
If not, please tell us, why.	*Too general; expected more clear idea about next steps; the agenda is not similared, was not so much time to discuss all problems;*						
Please score the following criteria with 5 being the best and 1 being the lowest mark		5	4	3	2	1	
Did the workshop achieve all its objectives?	fully	**16**	**11**	**2**			Not at all
How was the level of participation?	very high	**8**	**15**	**6**			very low
How was the moderation of the workshop?	excellent	**20**	**7**	**1**			very poor
How would you rank the quality of results?	very good	**15**	**11**	**3**			very poor
What is the applicability of the results to your working context?	very applicable	**11**	**12**	**4**	**1**		not at all applicable
Please give us some recommendations of what could be improved next time such a workshop is held.	*Some part of the questions need much more time; I think that all is excellent and very well prepared; more explanation about the project as whole (procedures, methodology etc.); it would be important to have at least some of papers being translated into Russian language; organisation of translation and materials in electronic form; all was there fine; objections to draft report from national representatives/experts should be realised before meeting; keep going! Room was bad.*						