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Berlin, 28. April 2004

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Edited by: Section I 1.4
Uwe Volkgenannt

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Contents / Inhaltsverzeichnis

1. Einführung

Der Schutz der Ostsee vor Umweltauswirkungen bleibt auch 30 Jahre nach Gründung der Helsinki-Kommission (HELCOM) wichtig. Jährlich gelangen immer noch knapp eine Milliarde Kilogramm Stickstoff und rund 40 Millionen Kilogramm Phosphor in die Ostsee, davon entstammen mehr als die Hälfte der Landwirtschaft. Grund für die hohen Phosphat- und Stickstoffeinträge ist vor allem eine räumlich konzentrierte, intensive Tierproduktion der Ostseeanrainer. Die Folgen: Algenwachstum, Sauerstoffmangel und hohe Schwefelwasserstoff-Konzentrationen bedrohen die ökologische Vielfalt der Meeresumwelt. Ein Rückgang der Nährstoffeinträge ist nur über gemeinschaftliche Anstrengungen – auch die der EU-Beitritts-länder – zu erreichen. Auf dem Seminar „Ostsee – Gute landwirtschaftliche Praxis in den neuen EU-Mitgliedstaaten und in der Russischen Föderation“ berichteten Vertreterinnen und Vertreter aus Polen, Litauen, Lettland, Estland sowie aus der Russischen Föderation über die aktuelle Situation der Landwirtschaft in ihren Ländern. Das Seminar fand gestern in Berlin statt. Veranstalter war das Umweltbundesamt (UBA) in Zusammenarbeit mit dem Institut für Pflanzenernährung und Bodenkunde der Bundesforschungsanstalt für Landwirtschaft, Braunschweig.

Fazit: Der Beitritt der Länder des ehemaligen Ostblocks zur Europäischen Union erfordert eine Neuausrichtung der agrarischen Produktion. Sie sollte sich an den Zielen der Agenda 21 orientieren, damit eine nachhaltige Landnutzung unter Schonung der knappen Ressourcen sowie akzeptable Umweltstandards möglichst rasch erreicht werden. So ließe sich die Eutrophierung, also die Nährstoffanreicherung und das damit verbundene schädliche Pflanzenwachstum in der Ostsee verringern.
Als Haupthindernisse einer umweltverträglichen Landnutzung nannten die Referentinnen und Referenten vor allem das niedrige Ausbildungsniveau, die mangelnde Kapitalausstattung und veraltete Technik landwirtschaftlicher Betriebe sowie ein geringes Absatzpreisniveau. Ferner muss das Umweltbewusstsein der Landwirte gestärkt und der Vollzug der Umweltgesetzgebung in den kommenden Jahren durch Beratung und Ausbildung dringend verbessert werden.
Das Umweltbundesamt ist über die Arbeitsgruppen der Helsinki-Kommission und der Agenda Baltic 21 aktiv an der Entwicklung nachhaltiger Landwirtschaft in den Baltischen Staaten, Polen und der Russischen Föderation beteiligt.

Introduction

Protecting the Baltic Sea from environmental impact remains important even 30 years after foundation of the Helsinki Commission (HELCOM). Every year some one billion kilograms of nitrogen and roughly 40 million kilograms of phosphorous are still being discharged into the Baltic Sea, of which more than half stems from agriculture. The high phosphate and nitrogen inputs largely owe to the intensive animal husbandry concentrated around the sea in littoral states. The consequences are algae growth, oxygen shortage, and high concentrations of hydrogen sulfide that jeopardize the biological diversity of the marine environment. A reduction of nutrient inputs can only be achieved in joint efforts made by all parites, including the EU accession countries. At a seminar on good agricultural practices in the new EU member states and the Russian Federation around the Baltic Sea, delegates from Poland, Lithuania, Latvia, Estonia, and the Russian Federation reported on the status of agriculture in their respective countries. The seminar took place yesterday in Berlin, hosted by the Federal Environmental Agency (UBA) in cooperation with the Institute of Plant Nutrition and Soil Science of the Federal Agricultural Research Center in Braunschweig.

In short, the accession to the European Union of the former Eastern Bloc countries requires redesigning agricultural production. It must be oriented towards the objectives of Agenda 21 so that sustainable land use, sparing consumption of scarce resources, as well as acceptable environmental standards may be achieved as quickly as possible. This would help minimize eutrophication, which is the accumulation of nutrients, and associated harmful plant growth in the Baltic Sea.

Some of the main hindrances to environmentally friendly land use mentioned by the delegates were lack of education, lack of capital investment, obsolete technology prevalent on farms, and low sales prices. Furthermore, the environmental awareness of farmers needs to be raised and execution of environmental law through consultation and training is in urgent need of improvement in the next few years.

The Federal Environmental Agency is involved in the development of sustainable agriculture in the Baltics, Poland, and the Russian Federation as part of the working groups of the Helsinki Commission and Agenda Baltic 21.

2. Opening

by Dr. Axel Friedrich, Federal Environmental Agency, Berlin

Ladies and Gentlemen,

I am delighted to welcome so many of you today to this seminar. I am particularly pleased that we have managed to recruit high-calibre speakers from the new EU Member States Estonia, Latvia, Lithuania and Poland and from the Russian Federation for this seminar. In three days, the Baltic States and Poland will become members of the EU. As you know, these accessions were preceded by a long phase of intensive negotiations over the modalities of the accession. All candidate countries have made enormous efforts in order to adopt the Acquis Communautaire. Cooperative partnerships between old and new EU Member States existed in many areas, including agriculture, so that it was possible to draw upon previous experience. A small component of these partnerships - in which the Russian Federation is, of course, also involved - are the Federal Environmental Agency's activities in the area of marine-environment protection in the Baltic region.

The Federal Environmental Agency has been active in marine-environment protection [ever since it was established]. A separate Agency section for this field has been in existence since […]. The Agency has been intensively involved in HELCOM working groups for many years, and also actively contributed, from the outset, to the elaboration of Agenda 21 for the Baltic Sea Region.

With its intensive work and cooperation in the field of agriculture within HELCOM and Baltic Agenda 21, the Federal Environmental Agency – with its Agriculture and Environment and Food Industry section – is supporting the transformation process in the Baltic States, Poland and the Russian Federation.

In this context, the successful cooperation between the governmental departments "environment" and "agriculture" deserves particular mention. I would like to take this opportunity to warmly thank the Federal Ministry of Consumer Protection, Food and Agriculture and the Federal Agricultural Research Centre for this excellent cooperation. Without the joint commitment of the departments involved, this successful work in an international context would hardly be possible. By taking on the function of lead

country, Germany has also assumed responsibility for helping countries in transition in their efforts to achieve a high environmental standard in agriculture.

That much remains to be done in this field is shown not least in the recent special report on “Marine Environment Protection in the North and Baltic Seas” of the German Council of Environmental Advisors (SRU). In its report, the Council states that eutrophication caused by high inputs of nutrients, particularly phosphates and nitrogen, remains one of the most serious threats to marine ecosystems. The Baltic Sea area is affected in its entirety by the outcomes of eutrophication. Despite considerable efforts in the prevention of phosphate inputs, eutrophication remains a huge problem. This is largely due to continued high inputs of nitrogen. The reductions in phosphate and nitrogen inputs by 50% each by 1995, agreed under the OSPAR and Helsinki agreements and by the International Conference on the Protection of the North Sea in the late 1980s, have only been achieved to a great extent for phosphate inputs – and that largely as a result of extremely cost-intensive modernisation of industrial and municipal wastewater treatment systems and the removal of phosphates from household laundry detergents. In contrast, the nitrogen reduction target remains largely unachieved; this is due for the most part to high nitrogen inputs from the use of fertilisers in agriculture. The latter thus pose a key challenge in marine environment protection policy. Rapid measures to reduce inputs are particularly important because it can be expected that concentrations will take some considerable time to react to reductions in nutrient sources. A great proportion of today’s inputs do not stem directly from anthropogenic sources, but rather from ‘stores’ that have built up on the seabed and in groundwater. Nor should we ignore the atmospheric nitrogen stores that contribute about one third of nitrogen inputs in the Baltic Sea and more than one fifth in the North Sea, the key source being agriculture followed by transport. Our aim is to continue devising practicable measures to reduce agricultural nutrient inputs into the Baltic Sea.

But not only the eutrophication problem needs to be solved. The enlargement of the EU and the associated changes for agriculture are just as important in the work that lies ahead. After years of declining production and the concomitant decrease in livestock numbers and in the use of mineral fertilisers, agricultural activity in the new EU member states can be expected to increase. At the same time, this presents these

countries with the challenge to limit the negative environmental consequences of these expected production increases from the outset. Prospects for this are not at all bad, since the reform of the EU common agricultural policy (CAP reform) offers the possibility to ensure right from the beginning that no production spiral detrimental to the environment is set into motion. The new EU Member States, therefore, should utilise the scope of the EU agricultural policy reform to this end. CAP reform should thus also be seen as a chance for the accession countries to move towards sustainable agriculture. Reaching beyond the topic up for discussion today, it is, however, also necessary to preserve (small-scale) farming and the vitality of rural areas. In this context, it is important that farmers be shown additional sources of income and employment opportunities. Agriculture, too, will have to do its part towards safeguarding natural resources, with the goal of achieving sustainable rural development.

I am very pleased that we have the opportunity today at the Federal Environmental Agency to obtain up-to-date information on good agricultural practice in the countries concerned, and wish all participants an informative seminar and continued successful cooperation.

3. German activities within the agricultural sector in HELCOM and Baltic 21

by Uwe Volkgenannt, Federal Environmental Agency, Berlin

Dear colleagues, dear guests,

its a great pleasure for me to welcome our colleagues from the Baltic Countries and the Russian Federation and I'd like to take the opportunity to thank all of them for coming to Berlin and presenting the Codes of Good Agricultural Practices.

The Federal Environmental Agency has been involved in HELCOM and Baltic 21 framework for a long time. For those of you who are not familiar with HELCOM and Baltic 21 I'd like to give an overview of our activities in Baltic Sea Region in the field of agriculture.

It is well-known that one of the main problems of the Baltic Sea is eutrophication. During the last decades the Baltic Sea has received increased loads of nutrients. To a great extent eutrophication is caused by nutrient inputs from agricultural sources. In total about 800 thousand tons of nitrogen and 40 thousand tons of Phosphor reach the Baltic Sea every year with negative impacts for the marine environment, for example blue-green algal blooms.

Algae-blooms in the Odra lagoon

Due to these negative impacts from runoff of manure, fertilizers and pesticides a number of HELCOM Recommendations have been elaborated to reduce these discharges.

In 1988 HELCOM adopted the so-called **50% goal** which means a 50% reduction of phosphate and nitrogen inputs until 1995. Since agricultural activities continued being one of the main sources of pollution to the Baltic Sea, in 1995 this goal wasn't achieved.

That was the reason why HELCOM decided to start further activities to reduce discharges of nutrients and pesticides to the marine environment. HELCOM intensified its activities in the field of agriculture and started the elaboration of an Annex Agriculture for the Helsinki Convention.

Extract from Annex III - Prevention of Pollution from Agriculture

Regulation 2; Plant nutrients
- Animal density
- Manure storage
- Agricultural waste water and silage effluents
- Application of organic manures
- Application rates for nutrients
- Winter crop cover
- Water protection measures and nutrient reduction areas

Regulation 3; Plant protection products
- Registration and approval
- Storage and handling
- Licence
- Application technology
- Testing of spraying equipment
- Alternative methods of control

www.helcom.fi

The so called Annex III – Prevention of Pollution from Agriculture - was adopted in 1998. The Annex III “Agriculture” sets out requirements for environmentally sound agriculture and provides the necessary framework for the harmonization and strengthening of national legislation for agriculture. The full text of Annex III is available on HELCOM homepage. There are, for example, regulations concerning nutrient management and pesticide application as well as regulations on environmental permits for livestock production or the promotion of farm advisory systems.

In 1999 Germany took the lead country responsibility for the agricultural sector within HELCOM and in the same year the Working Group on Agriculture (WGA) was established. A close co-operation between the Federal Ministry of Consumers Protection, Food and Agriculture, the Federal Research Centre in Braunschweig and our Agency was initiated in order to run the Working Group on Agriculture efficiently .

Now I would like to draw your attention to some main aspects of WGA work.

Main Topics of the WGA work:

• assessment of the implementation of the Annex III;
- many HELCOM Member Countries have already implemented laws, recommendations
and guidelines to fulfill the requirements of Annex III.
• the removal of so-called “agricultural hot spots”;
- four agricultural Hot Spots in Germany, Estonia and Latvia have been deleted and the Lithuanian Hot Spot was substituted with a smaller one
• the review of existing “old” HELCOM Recommendations;
- in 2003 adoption of a new umbrella recommendation “Agriculture” concerning measures aimed at the reduction of emissions and discharges
from agriculture
• co-operation with other organizations such as BALTIC 21 and
Global Environment Facilities (GEF) Baltic Sea Regional Project
as well as NGOs and scientific experts

One important goal of the WGA work was the implementation of Annex III. The implementation requires *inter alia* the development of national programs and codes of good agricultural practices. The codes provide, for example, concrete recommendations for the environmentally sound use of fertilizers and guidance on the storage of farm manure.

The WGA started an assessment project in order to find out to which extent the regulations of Annex III have been implemented.

According to the results of this project we can conclude that many HELCOM Member Countries have already implemented laws, recommendations and guidelines to fulfill the requirements of Annex III.

For example most countries have implemented legislation concerning manure storage and application of organic manure and fertilizers as well as recommendations concerning winter crop cover and soil erosion.

The two major weak points are the lack of knowledge of what is really happening at farm level and what are the real effects on the aquatic environment.
Another weak point is, of course, the fact that recommendations are not legally binding. Therefore, the effect often depends on the motivation of the individual farmer, on the effectiveness of the advisory system and on financial support.

More detailed information on this topic you will get in a few minutes from our national experts.

Hot Spots:
Another task of the WGA work was the elimination of agricultural “hot spots”, that means regions in which agricultural activities make a very large contribution to the pollution of the (marine) environment.

In 1999 the list of agricultural “hot spots” comprised 16 areas, which are characterized mainly by intensive livestock farming. Measures to improve the environmental situation have already been taken in most of these areas. The Working Group on Agriculture assisted the countries in the initiation of measures to eliminate these “hot spots”. The WGA also approved the successful implementation of these measures.

As a result of this assistance four agricultural Hot Spots in Germany, Estonia and Latvia have been deleted from the list and one Lithuanian Hot Spot was substituted with a more targeted smaller Hot Spot.

Another “field of action” was the review of existing HELCOM recommendations. After the adoption of Annex III there was a need to evaluate the existing “old” HELCOM recommendations dealing with agriculture. Therefore the WGA elaborated a new umbrella Recommendation “Agriculture” (concerning measures aimed at the reduction of emissions and discharges from agriculture), which covers all aspects outside of ANNEX III. The umbrella Recommendation “Agriculture” was adopted last year by HELCOM 24. And a number of old recommendation were deleted.

From the beginning on the Working Group on Agriculture has developed into an important forum of exchange of knowledge. The WGA has provided the scientists and experts from EU-Accession Countries and the Russian Federation with the opportunity to discuss specific issues and to establish contacts.

Last but not least WGA co-operated with other organizations such as the Global Environment Facilities (GEF) Baltic Sea Regional Project and Baltic 21.

A close co-operation with the Baltic 21 Sector Agriculture was started and since 2001 several back to back meetings have been held.

This will lead over to our current activities within the Baltic Sea Region.

As you may know in the late 90ties another important process in the Baltic Sea Region was initiated. As a follow up of the Rio World Summit, in 1998 the Foreign Ministers of the Baltic Sea States adopted the Agenda 21 for the Baltic Sea Region.

Eleven countries from the Baltic Sea Region, the European Commission and a number of intergovernmental organizations, international financial institutions and NGOs were involved in this process.

The Baltic Sea Region is the first region in the world that has adopted a regional Agenda 21. The Baltic Agenda 21 is an important step towards sustainable development within the region and includes an overall goal for sustainable development as well as goals for each of the Baltic 21 sectors.

Agriculture is one of the eight sectors of crucial importance to this region. From the beginning of that process Germany has supported the idea to promote sustainable agriculture within the Baltic Sea Region. The Ministry of Consumer Protection, Food and Agriculture as well as the Ministry of Environment and our Agency have intensively contributed to the elaboration of the sector report agriculture.

Goal for sustainable agriculture

Agriculture contributes significantly to the society of the future.
Sustainable agriculture is the production of high-quality food and other agricultural products and services in the long run, with consideration taken to
economy and social structure in such a way that the resource base of non renewable and renewable resources is maintained.

Agriculture is very important for all the countries in the Baltic Sea Region. Agriculture meets societies' needs of high quality food and recreation. Agriculture contributes to landscape preservation and to the conservation of the cultural heritage of rural areas.

To vitalize Baltic Agenda 21 an Action Program was adopted which addresses the three dimensions of sustainable development – the environmental, the social and the economic aspects. The Action Program for the sector agriculture focused on the promotion of education and training as well as on the creation of demonstration areas and the development of a "virtual research institute" for sustainable agriculture in the Baltic Sea Region.

To transport that action program from paper into practice the Baltic 21 Senior Officials Group which is the steering Group of the Baltic 21 process, asked Germany last year to take over the Lead Party responsibility for the agricultural sector.

Germany took over the Lead Party function because it is very much in line with the new German agricultural policy towards the implementation of sustainable agriculture.

Recently a Task Force Sustainable Agriculture was established in order to reinforce and strengthen the work. On its first working meeting (yesterday and the day before yesterday in Lübeck) the Baltic 21 Task Force Sustainable Agriculture adopted an ambitious work plan which focuses for example on strengthening the cross-sectoral co-operation, the promotion of organic farming or the installation of a "virtual research institute" in the Baltic Sea Region.

Looking to the future we are fully aware that there is still a lot of work to do. All future activities towards the implementation of sustainable agriculture in the Baltic Sea Region will also be affected by the long term change of the EU Common Agricultural Policy. And special attention is also needed for the integration of the Russian Federation as an important regional actor outside of the EU.

Thank you for your attention!

3. Future challenges for agriculture in the Baltic Sea Region

by Prof. Dr. Dr. Ewald Schnug, Institute of Plant Nutrition and Soil Science, Federal Agricultural Research Center, Braunschweig, Germany

(modified Power Point Presentation without background pictures)

Sustainable Development

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

from

"Our Common Future"

The Brundtland Commission, 1997

Fatal Harvest

The Tragedy of Industrial Agriculture

“We currently live in the economy and culture of the “one-night stand“. Industrialism has provided us innummerable commodities, amusements, and distractions, but these offer us little satisfactions. Instead we suffer ever-increasing alienation from our families, our communities, and the natural world. There is another way to live and think: it‘s called agrarianism. It is not so much a philosophy as a practice, an attitude, a loyality; and a passion – all based in a close connection with the land. It results in a sound local economy in which producers and consumers are neighbors and in which nature herself becomes the standard for work and production.“ (*Wendell Berry, 2002*)

The deadly risk for the development of sustainable agriculture in the Baltic Sea Region

- unreflected copying of western principles for agricultural production:

(e.g.: GMOs, PAPs, intensive animal production, Precision Agriculture)

The Need:

A holistic understanding of agriculture

"A healthy farm culture can be based only upon familiarity and can grow only among people soundly established upon the land; it nourishes and safeguards human intelligence of the earth that no amount of technology can satisfactorily replace. The growth of such a culture was once a strong possibility in the farm communities of this country. We now have only the sad remnants of those communities. If we allow another generation to pass without doing what is necessary to enhance and embolden the possibility now perishing with them, we will lose it altogether. And we will not only invoke calamity - we will deserve it."

(Wendell Berry, 2002)

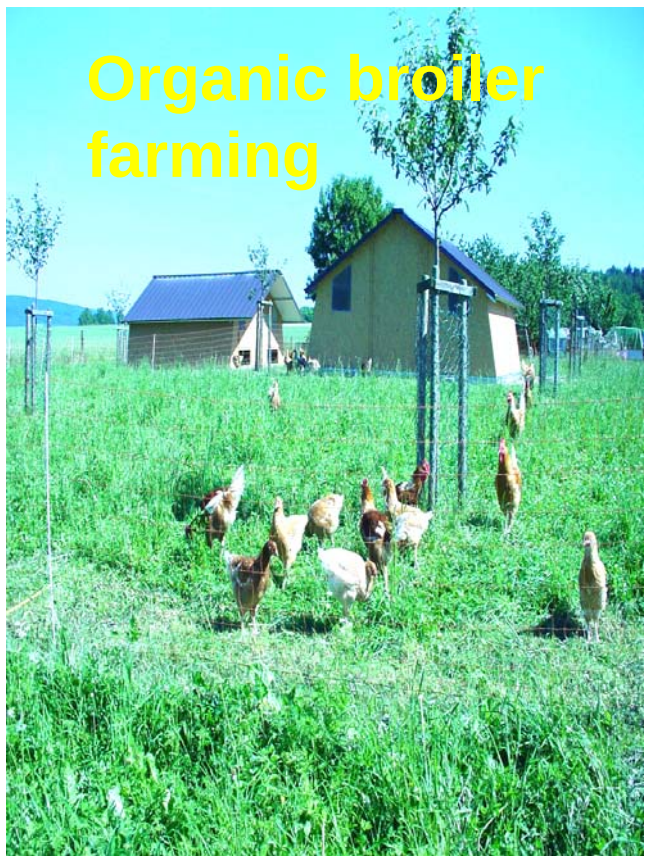
Challenges for the development of sustainable agriculture in the Baltic Sea Region

Adoption and improving of favourable agroenvironmental standards (GAP-codes) and agricultural practices (BEP)

Development of new perspectives for agriculture (Authentic food production – production of authentic food)

"Authenticity will be the buzzword of the 21st century. But what is authentic? Anything that is not devised and structured to make a profit. Anything that is not controlled by corporations. Anything that exists for its own sake, that assumes its own shape"

(from "Time Line" by Michael Crichton, 2000)



Either food security or organic farming

“World hunger is not created by lack of food but by poverty and landlessness, which deny people access to food. Industrial agriculture actually increases hunger by raising the cost of farming, by forcing tens of millions of farmers off the land, and by growing primarily high-profit export and luxury crops" (Kimbrell, 2002).

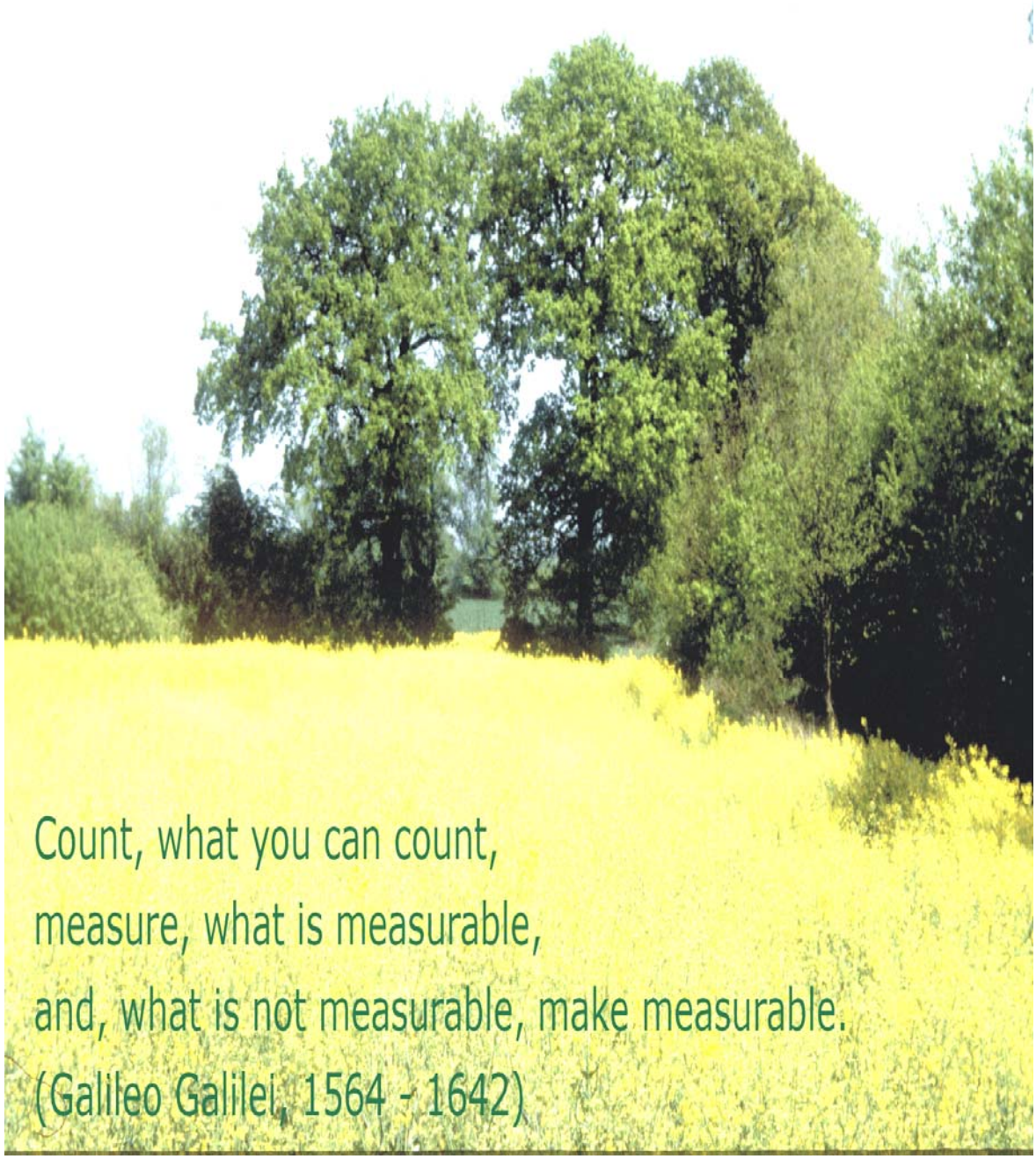
To the agrarian mind, which is the only mind capable of rebuilding the culture of healthy soils, water cycles richness and diversity. May it multiply in future generations so they can recoup what has been lost and create farms and economies that are sustainable, humane, and beautiful. And to wildness, that essential quality whereby nature in all her wisdom unfolds with a genius that can only be manifested by undomesticated unhumanised, and unmanaged large portions of the landscape."

Dedication to Kimbrell´s “Fatal Harvest”

"A healthy farm culture can be based only upon familiarity and can grow only among people soundly established upon the land; it nourishes and safeguards human intelligence of the earth that no amount of technology can satisfactorily replace. The growth of such a culture was once a strong possibility in the farm communities of this country. We now have only the sad remnants of those communities. If we allow another generation to pass without doing what is necessary to enhance and embolden the possibility now perishing with them, we will lose it altogether. And we will not only invoke calamity - we will deserve it."

(Wendell Berry, 2002)

Important characteristics of organic farming are manifold crop rotations, renunciation of pesticides and mineral nitrogen fertilisers (EU Regulation 2092/91).


Count, what you can count,
measure, what is measurable,
and, what is not measurable, make measurable.
(Galileo Galilei, 1564 - 1642)

5. Country reports

5.1 Agro-environmental problems in Latvia and role of the GAP Code

by Prof. V. Jansons, Department of Environmental Engineering and Water Management, Latvia University of Agriculture.

5.1.1 Introduction

The wish to ensure country's economic growth and to improve the welfare of its people should not cause excessive reduction of nature resources, increase of environmental pollution and loss of biological diversity. Otherwise, it may threaten state's sustainable development. Therefore, improvement of economic infrastructure should go hand-in-hand with the environment protection infrastructure. balanced and sustainable development of the state's territory should be the priority in Latvia.

The water quality and degradation of inland aquatic ecosystems, as well as the Baltic Sea and Gulf of Riga are ones of the prior environmental problems mentioned in the National Environmental Protection Plan for Latvia. The main goal for the water protection is to reduce pollution load from different types of activities and sources (households, industry, agriculture, forestry etc.). The main anthropogenic load to the Baltic Sea is load and loss from agriculture, sewage treatment plants and industries with own discharge. In addition comes atmospheric deposition. To reduce these loads effective sectorwise approach is needed. As an overall conclusion the reduction of load from point sources has been more successful than reduction in the diffuse load.

Structural changes in agriculture and economic situation caused significant reduction of the agricultural production, e.g. area of crops and number of livestock in Latvia. Due to this, even without special measures, the environmental impact of agriculture as a "hot spot" has decreased. Economic situation in Latvia has started to improve since 1995, and increase in both fertilizer and plant protection product application shows also a slow recovery in the agricultural sector.

To improve the use of environmentally friendly technologies in agriculture and promote the education of farmers, since mid 1990-ties several international projects supported efforts in the education of farmers, control, and management of environment in Latvia. Projects focused on the new private farmers whose level of education, knowledge and farming skills were limited. Another important group is agricultural consultants, teachers and students in the agricultural schools.

5.1.2 Agriculture and Environment

It can be predicted that agricultural production will rise in the Latvia, which will lead to increased discharges if protection measures are not intensified. There is therefore a need to strengthen the relevant measures. Most important are as follows:

- Legislation,
- Development of Action Programme,
- Implementation of Action Programme.

5.1.3 International legislation (EU and HELCOM)

Latvia's political movement towards the integration into the European Union (EU) has have a substantial influence on further development of the environmental sector. After successful referendum in September 2003 Latvia is planning to join the EU in May 2004. Transposition and implementation of the EU environmental legislation into national laws is a priority at the moment.

Generally, full transposition of the EU Directives has been achieved. However, effective compliance with of legislation (e.g. referring to waste water treatment, drinking water, nitrates from agricultural sources etc.) could be achieved only into the long term and would require a significant increase in environmental investment, as well as a major effort to reinforce the administrative capacity in all institutional levels.

The main principles of the following EU directives were transposed to national water protection legislation:

- Water Framework Directive 2000/60/EC
- Directive 96/61/EC On Integrated Pollution Prevention and Control
- Nitrates Directive 91/676/EEC
- Dangerous substances Directive 76/464/EEC, and its daughter directives,
- Groundwater Directive 80/68/EEC
- Urban Wastewater Directive 91/271/EEC.

Latvia ratified the Convention on the Protection of the Marine Environment of the Baltic Sea Area in 1994. The Helsinki Convention was amended with the 2-nd part (Agriculture) of the Annex III in year 2000. Therefore, Latvian environmental legislation concerning agriculture should take into account also the main provisions ob HELCOM Convention covering:

- Plant nutrients
- Animal density
- Manure storage
- Agricultural waste water and silage effluents
- Application of organic manures
- Application rates for nutrients
- Winter crop cover
- Water protection measures and nutrient reduction areas
- Plant protection products
- Environmental permits
- Environmental monitoring
- Education, information and extension service

5.1.4 Agri-environmental legislation in Latvia

The legal system of environmental protection and management in Latvia consists of laws and regulations. Laws establish the general management principles, while regulations delineate the detailed requirements for implementing the requirements established by law. The main laws related to protection of environment and agriculture are:

- “Law on Environment Protection" (1991)
- “Law on Pollution” (2001)
- “Law on Protection Belts” (1997)
- “Law on Land Reclamation" (1993)
- “Law on Environmental Impact Assessment” (1998)
- "Law on Water Management“ (2002)
- "Law on Fertilizers" (2001)

The requirements of Latvian water protection legislation are being harmonized also with the provisions of the Directive 96/61/EC On Integrated Pollution Prevention and Control. **The Law on Pollution** (adopted on 15 March 2001) determines the basic requirements for pollution prevention, including control over emissions into air, water and soil. Law on Pollution also gives a mandate for establishment of the environmental quality standards for surface and ground water and for definition of wastewater emission limit values. IPPC permits should be issued for the current and for all new IPPC installations and substantial changes in existing installations in Latvia (is a requirement) were introduced from 1 January 2002, according to the Law on Pollution. According to the Law on Pollution the Cabinet of Ministers issued **Regulation “On the Protection of Water and Soil from Pollution Caused by Nitrates from Agricultural Sources”** (transposition of the EU Nitrate directive) entering in force on December 29, 2001. The Cabinet of Ministers Regulations “On Water Emissions of Pollutants” combines the requirements of the Dangerous substances Directive 76/464/EEC, and its daughter directives, as well as those of the Groundwater Directive 80/68/EEC and the Urban Wastewater Directive 91/271/EEC. Full transposition of the above-mentioned Directives has been achieved. Besides the other provisions, the Regulations identify the entire territory of Latvia as sensitive area according to the requirements of the urban wastewater directive.

In order to implement in Latvia the requirements of the Nitrates Directive, following steps have been performed:

1. Designation of vulnerable zones and establishment of the Nitrate Board (2001);

2. Preparation and implementation of the Action Program in vulnerable zones (2003 - 2008);
3. Implementation of the Code of Good Agricultural Practice for Latvia on voluntary base in the territory of the whole country (1999-2003);
4. Preparation and implementation in vulnerable zones of a new version of GAP Code (2003 - 2008)
5. Preparation and implementation of the Water Monitoring Program relevant to the provisions of the EU Nitrate Directive and Water Framework Directive (2002-2004).

5.1.5 Vulnerable zones

Latvia has no territories with nitrate content higher than 50 mg/l both in groundwater and surface water. In general, eutrophication and especially the growth of toxic blue-green algae's in inland and costal waters is considered as an acceptable and limited to compare with other countries and areas in the Baltic Sea region.

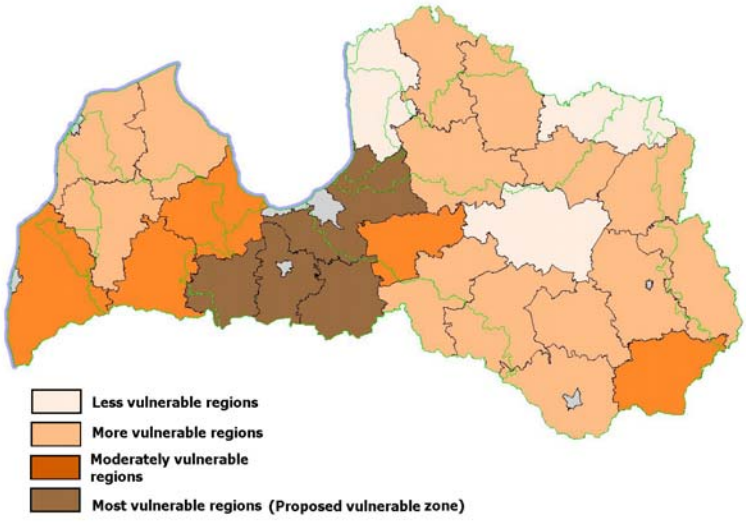


Figure 1. Vulnerable zone regarding Nitrate Directive in Latvia.

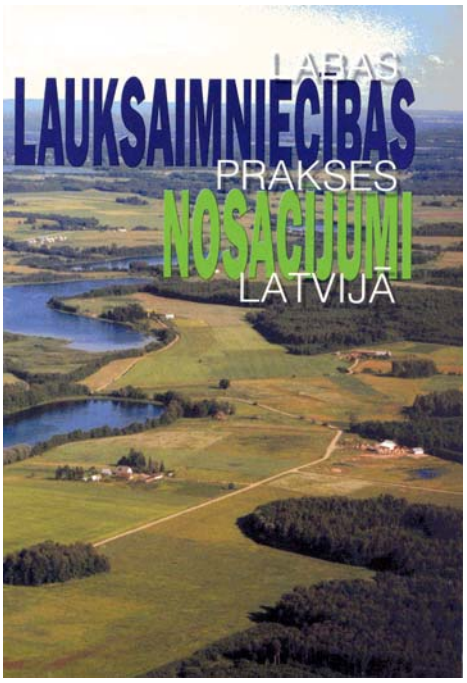
Four districts with most intensive agriculture were designated as vulnerable zone in the central part of Latvia, assuming that in future this part of the country may be most relevant to the provisions of the Nitrate Directive. The Ministry of Agriculture and the Ministry of Environment are the responsible state institutions to supervise and monitor

the implementation of the Nitrate Directive. Agricultural run-off monitoring started in 1994. The development of the Action programmes for vulnerable zones was started in 2003.

GIS modelling and analysis was used to determine the most vulnerable territories concerning the agricultural impact. The evaluation was based on a number of factors on both soil and groundwater media, such as run-off, potential erosion risk, vulnerability of ground water, agricultural activities (agricultural land, arable land, animal density, soil drainage, application of fertilizers etc). Factor weights were computed and the resulting impact data layer designed to show the result of Multi-Criteria evaluation to derive the potential agricultural risk map or map of proposed vulnerable zones. Based on that approach four districts of Latvia (Jelgava, Dobele, Bauska and Riga) were designated as vulnerable zone.

5.1.5 The Code of Good Agricultural Practice for Latvia (1999)

The Code of Good Agricultural Practice was for the first time elaborated and approved in Latvia in 1999. GAP Code (Figure 2) included:



- Existing legislation and regulations that are is compulsory everywhere in Latvia;
- Description of the actual agro-environmental problems and coming regulations in the nearest future (EU, HELCOM);
- Future aspects and visions, whose implementation today could be profitable in future

Figure 2. First version of GAP Code for Latvia (1999).

Main chapters of GAP code (1999) were:

1. Plant production, soil and fertilization
2. Animal husbandry
3. Collection and storage of organic manure
4. Plant protection
5. Water resources
6. Farming systems
7. Biological diversity and landscape

The requirements of the GAP Code were not obligatory for farmers. However, in connection with education for environmentally friendly farming, it could promote a voluntary implementation of HELCOM recommendations by farmers. Step by step, some of the GAP Code points were included in the legislation coming after 1999.

Moreover, there was a need for a further development of this process e.g. development and implementation of obligatory environmental rules and Action programme for the vulnerable zone.

Therefore, important for agriculture was the Regulation of Cabinet of Ministers on the "Protection of Water and Soil from Pollution Caused by Nitrates from Agricultural Sources". It should be noted that legislation without financial support will not ensure a fulfillment of requirements, e.g. such measures as construction of manure storages and purchase of the advanced manure application equipment are very expensive. The EU SAPARD programme for Latvia started in December 2001. SAPARD payments include support for agro-environmental measures and improvement of the animal barns. The sub-measure of SAPARD's environmental programme started in 2003.

Of course, the crucial and most expensive part (Table 1.) of Action programme will be the improvement of manure handling in the farms. Manure storages in most of the farms in Latvia, like in all former post soviet countries, do not have of such quality that prevents losses. Often they do not have sufficiently large storage capacities.

Table 1. The necessary investments for improvement of manure holding in farms in the vulnerable zones

Farm group	Number of farms	Investments, million EUR			
		Cattle farms	Pig farms	Poultry farms	Total
>250 LU	38	2,23	0,51	1,58	4,32
101-250 LU	24	1,22	0,11	0,02	1,35
51-100 LU	25	0,71	0,03	0,07	0,81
5-50 LU	1, 853	20,44	0,14	0,01	20,59
Total	1, 940	24,60	0,79	1,68	**27, 07**

Various countries (Denmark, Sweden) have set up their own more strict regulations than the Nitrate Directive obligated. When assessing the application of stricter measures in Latvian conditions it should be considered whether measures are acceptable in order to avoid economic problems in farms. Strict and fast implementation of similar regulations may have negative impacts and consequences on farms in vulnerable zones in Latvia.

It will also be important that limited number regulations in the new version of GAP Code are clearly set out and can be easy controlled by authorities.

5.1.6 The new version of the Code of Good Agricultural Practice for Latvia (2004)

In the new version of the GAP Code for Latvia regulations are required in areas such as:

- Organic manure;
- Mineral fertilizers;
- Plant nutrient balances.

The following will be the main points in the new GAP Code:

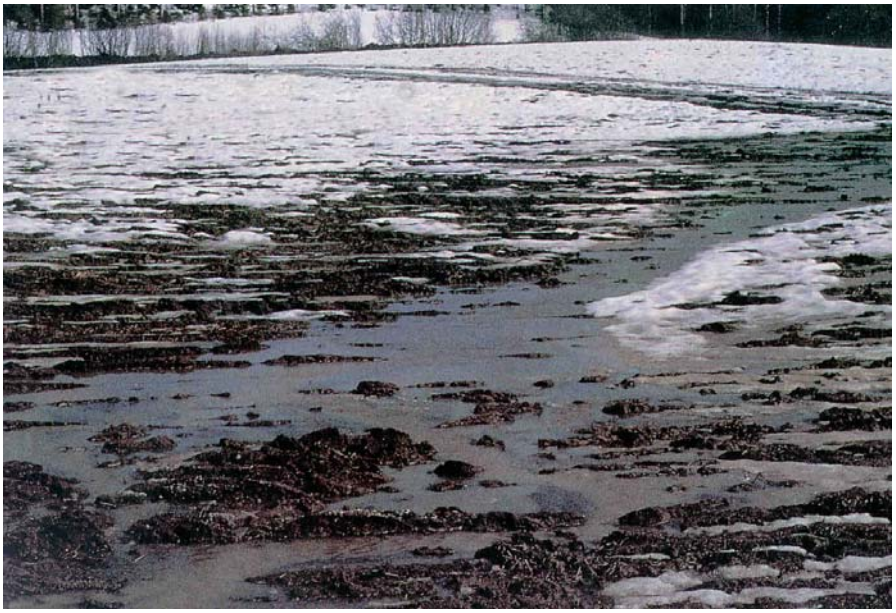
5.1.6.1 Periods when the land application of fertilizer is inappropriate

Application of solid manure, slurry and urine is allowed from 15. March till 15. October.

5.1.6.2 The land application of fertilizer to steeply sloping ground

If the slope is more than 10^{o}, application of organic manure is allowed only on vegetation or if the manure is incorporated in the soil.

5.1.6.3 The land application of fertilizer to water-saturated, flooded, frozen or snow-covered ground



Application of fertilizers on frozen, water-saturated, flooded or snow-covered ground is not allowed in Latvia

5.1.6.4 The conditions for land application of fertilizer near water courses

10 m buffer zone, where fertilizer application is not allowed, along water courses (incl. drainage main channels), lakes and water reservoirs should be established. Application

of fertilisers in such areas is not allowed. Around drainage chambers is the 8 m buffer zone, where fertilizer application is not allowed.

Application of fertilisers in the flooded areas with the forecasted spring flood probability of up to 25 % (flooding risk once in 4 years) is not allowed. Application of fertilisers in such areas is allowed only during vegetation period when nutrient uptake of crops is high.

5.1.6.5 The capacity and construction of manure storage, including measures to prevent water pollution by run-off and seepage into the groundwater and surface water caused by livestock manures and effluents of silage;

Manure storage must be of such a quality that prevents losses. The storage capacity shall ensure that manure only will be spread when the plants can utilize nutrients. The minimum level should be a six months storage capacity for solid manure and eight months for urine and slurry.

5.1.6.6 Procedures for the land application, including rate and uniformity of spreading, of both chemical fertilizer and livestock manure, that will maintain nutrient losses to water at an acceptable level

Organic manures shall be spread in a way that minimizes the risk for loss of plant nutrients. Application rates for organic manure should not exceed 170 kg/ha. There must be a balance between the amount of animals on the farm and the amount of land available for spreading manure, expressed as animal density. Animal density should not exceed 1,7 LU.

5.1.6.7 Land use management, including crop rotation systems

All farms producing for market and with acreage more than 10 ha should have crop rotation (3 ha for vegetable farms).

5.1.6.8 The maintenance of a minimum quantity of vegetation cover (green land) during periods autumn – winter period

The area of green land should be at least 50 % during autumn-winter period

5.1.6.8 The establishment of fertilizer plans on a farm-by-farm basis and the keeping of records on fertilizer use

All farms producing for market and with acreage more than 10 ha should have nutrient balance and fertilization plans.

5.1.6.9 The prevention of water pollution from run-off in irrigation systems

The surface and drainage run-off should be prevented during irrigation.

5.2 Good Agricultural Practice in Estonia

by Ms. Tiiu Raia, Ministry of the Environment of Estonia

5.2.1 Current situation in Estonian Agriculture

With an area of 45 000 km², Estonia is larger for example than Slovenia, Holland, Denmark or Switzerland. Estonia stretches 350 km from east to west and 240 km from north to south.

The climate conditions and relief of the region have caused formation of numerous small inland water bodies in the territory of Estonia. Annual precipitation here exceeds evapotranspiration and the excess water (200–300 mm/year) runs off via rivers. The territory is divided into four basins: the drainage basin of Lake Peipsi (38%), the drainage basin of the Gulf of Finland (excl. the Narva River; 21%), the Gulf of Riga (32%) and the islands of West-Estonia (9%). The most important watershed area in the region is Pandivere Upland.

Estonia's population ranks amongst the smallest in the world: an estimated 1.356.000 people live in Estonia — a density of only 30 people per km². Approximately a third of the nation live in Tallinn and about 67% of the population reside in cities in general and 33% in rural area.

The average share of agricultural workers is 5% (the respective figure for the year 1991 was 16%).

Farming has quite a long history in Estonia. Like the rest of Estonian history, the history of agriculture here is rich in changes. The economic situation of the agricultural sector, the structure of agricultural enterprises, land use and employment all underwent significant changes as a result of reforms.

During four years from 1999 to 2002, area forest changed 2 % - from 47% to 49%, but changes in agriculture were bigger: agricultural land decreased 303 thousand hectares - 22% to 15% from whole land use. Arable land area reduced 5% and permanent grassland area 2%. Total area under field crops was nearly 813,000 ha, including ca 420,000 ha of grasslands, which forms 52% of the total area under crops. The size of unused lands was 270,000 ha. Only a half of this can be put to use again as pasture, because the unused lands have overgrown with bushes or become wetlands in 3-4 years, as there was no maintained drainage system.

Figure 1: The share of cultivated land

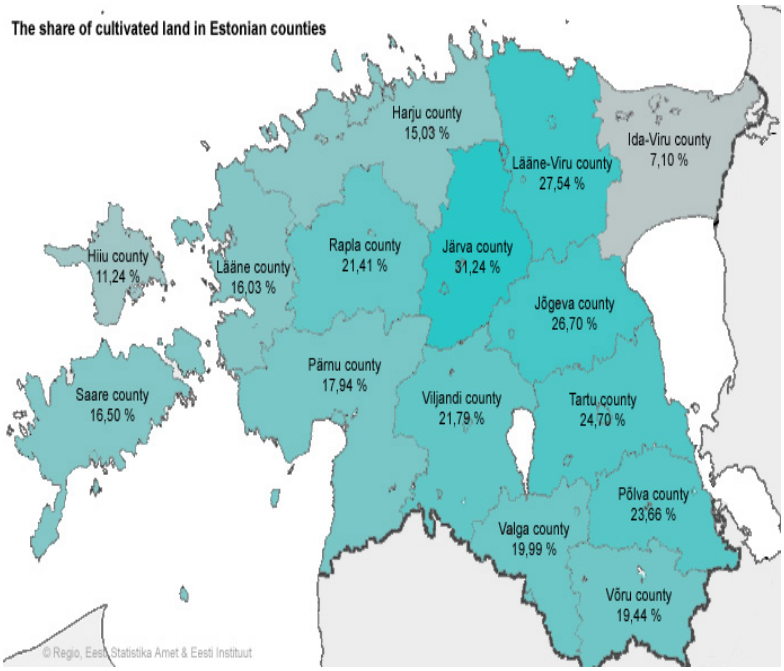
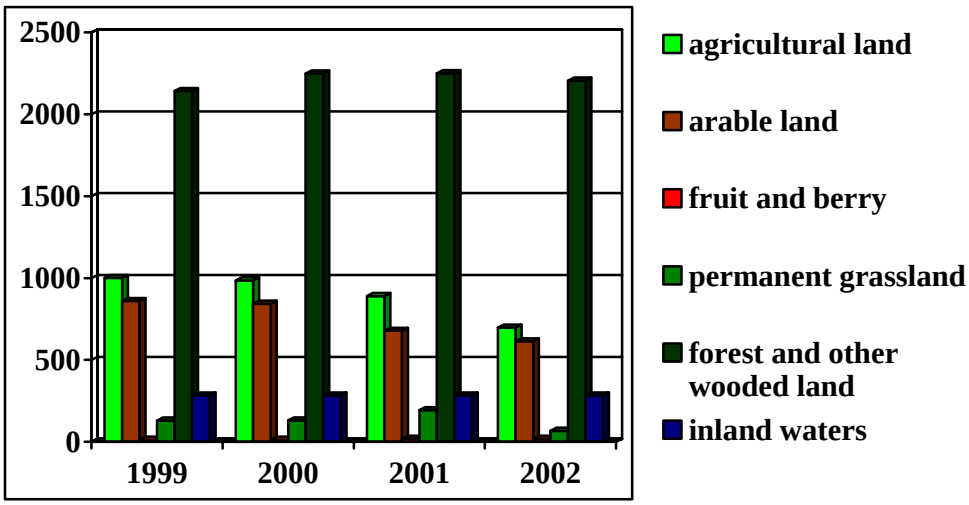


Figure 2: Land use 1999 – 2002 (thousand hectares):



According to the data collected in an agricultural census, there were 85,300 agricultural holdings and 176,400 family agricultural holdings in Estonia in 2001. In fact, the number of farms engaged in production was much smaller. In 1999, 11,700 such farms were registered and, on average, one farm guaranteed annual employment for 0.6 workers. In 1996–2001, as a result of low producer prices and small subsidies, investments in Estonian agriculture amounted to 11% in respect of the value added which is 2.5 to 3 times less than in most European countries (25–30%) and four times less than in Sweden and Finland.

52% of agricultural land was in the ownership or possession of farms, 31% belonged to agricultural enterprises and private households owned 17%. In 2001, the average size of a farm was 20.7 ha which included 9.1 ha agricultural land and the average agricultural enterprise had 467 ha agricultural land.

Total agricultural production in 2001 was 6.6 billion croons of which livestock production constituted 3.9 billion croons or 59%. Milk production constitutes 29%, which is the largest portion of agricultural production. One-third of all dairy products are exported, mostly to Member States of the European Union. The cows' productivity has been continually increasing since 1994; the average milk production per cow reached 5,700 kg by 2002. The main part of milk production is concentrated into 340 large farms where three-fourths of all the cows are kept. At the same time, owners of small herds of one to five cows constitute 88% of all livestock farmers. However, the number of small-herd owners is constantly decreasing as stricter requirements are being established for farms and the quality of milk. In order to comply with quality requirements, large investments for the renovation of cowsheds, manure storages and acquisition of modern milk production equipment are needed, but such contributions are beyond the reach of small herd owners.

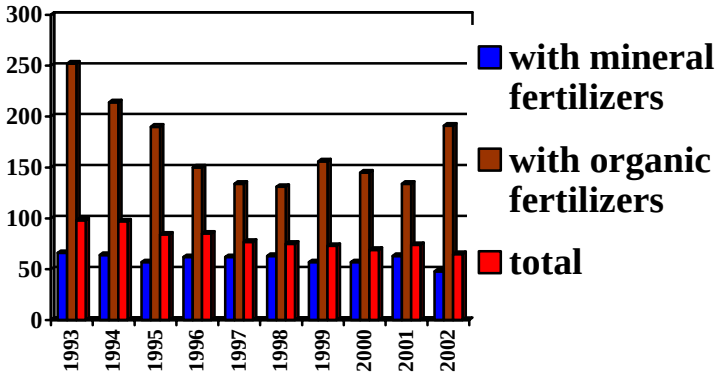
The climate in Estonia is mostly suitable for the cultivation of grasses, potatoes, traditional vegetables and Nordic fruits and, in central Estonia, also for the cultivation of grain. Grain is mostly grown in large farms and enterprises. 60% of grain is grown in enterprises with a growing area of more than 100 ha. Small farms where the growing area for grain is less than 10 ha produce only 8% of all grain.

Agricultural enterprises are divided into three main types according to type of production: 45% of undertakings are engaged in plant production, 21% in dairy farming and 31% in mixed production (both plant production and livestock farming).

In 2002, mineral fertilisers and plant protection products were used in Estonia, on average, 1.8 to 2 times less than needed in order to ensure economic efficiency. Amount of nitrogen carried into the soil with mineral fertilizers decreased from 66 to 48 kg/ha during ten years. In 2002, the average grain yield was 2113 kg/ha and average nitrogen use was 65 kg/ha.

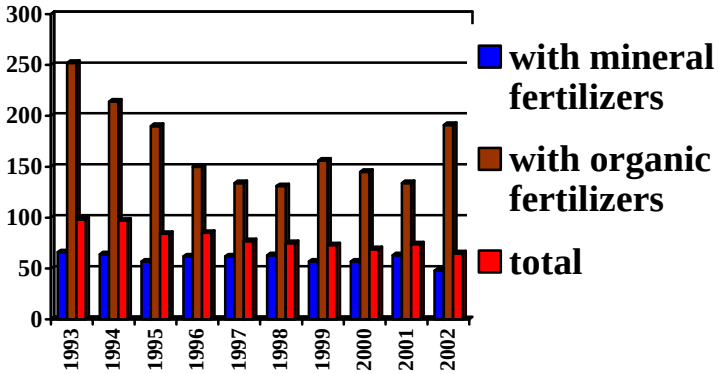
Figure 3: Environmental pressure by agriculture - Amount of nitrogen kg/ha

Amount of diphosphoruspentaoxide carried into the soil with mineral fertilizers have



not changed a lot, average during ten years generally between 8 to 13 kg/ha. Phosphorus carried into the soil with organic fertilizers decreased from 102 kg/ha to 68 kg/ha. In 2001 48% of arable land were fertilized with mineral fertilizers and 7% with organic fertilizers of the sown area. However, the limited use of fertilisers and plant protection products has attracted the interest of companies in organic farming in Estonia.

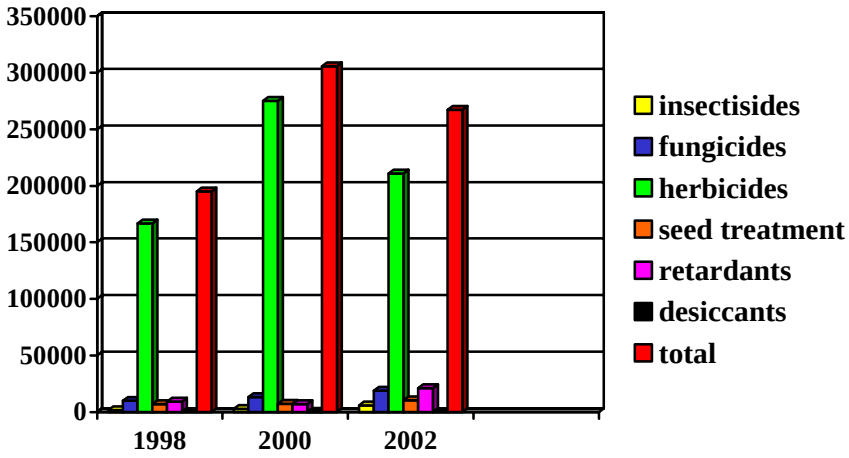
Figure 4: Amount of diphosphoruspentaoxide kg/ha



The major part – up to 79 % of the applied pesticides has always been made up from weed control preparations, 8% retardants, 7% fungicides, 4% seed treatment preparations and 2% insecticides. 90% of pesticides used by enterprises are hazardous, of which 47% irritating and 43% small toxic. Most used active substances are MCPA, glyphosates and dicamba.

The main users of pesticides were farms with an area more than 100 ha.

Figure 5: Use of pesticides (active substance kg)



5.2.2 Agro-Environmental legislation in Estonia

To help guarantee sustainable development in Estonia, the Estonian Parliament adopted a National Environmental Strategy in 1997. One of the goals is the protection of surface water bodies and coastal seas. The main focus of environmental measures is to prevent an increase of nitrogen and phosphorus discharges when agriculture recovers.

Estonia implemented EU Nitrate Directive and the Code of Good Agricultural Practise. Introduction of modern fertilisers and manure handling techniques and other measures required by the Nitrate Directive and Code will decrease impacts on the environment.

Main regulations for fertilization and manure management:

The average amount of total nitrogen applied with organic fertilizers shall not exceed 170 kg N per hectare of arable land and in the form of mineral fertilizers such amount of nitrogen, which is necessary for the growth of field crops (amounts are set up in Government Decree).

In the nitrate sensitive zone it is allowed, on the basis of the protection rules, to restrict the average annual amount of nitrogen when applied in the form of mineral fertilizers up to 140 or 100 kg per hectare of arable land. Pandivere upland of the Estonian Republic is classified as vulnerable zone.

The average amount of phosphorus per hectare of arable land is up to 30 kg, as applied in the form of mineral fertilizers.

Silage effluent has to be diluted before spreading in the proportion 1:1 and the rate of application of this mixture per hectare shall be up to 30 tonnes.
If the nitrogen fertilizer norm exceeds 100 N kg/ha, the fertilizer must be applied in two parts.
It is prohibited to spread mineral and organic fertilizers during the period from 1st of November to 31st of March and also must not be spread on snow or on frozen soil.
Manure, silage effluent and mineral fertilizers must not be spread in the sanitary protection zone of water intake, in the water protection zone of a water body and on periodically flooded land.

The Water Act provides that agricultural producer must keep a field book where he records the data about the area of arable land, the characteristics of the soil, volume of harvested crops, types and amounts of fertilizers used and the dates when they were used.
In Estonia the number of animals per hectare of cultivated land must not exceed 2 livestock units. In nitrate sensitive zones the limit is 1,5 livestock unit per hectare.
All farm buildings for livestock where more than 10 livestock units of animals are kept must have a manure storage facility and urine depot.
The minimum capacity for the manure storage facility must correspond to the amount of manure produced in 8 months. A manure storage facility must be designed, built and maintained so that to avoid pollution of surface water or groundwater, influx of precipitation and surface water into the storage and to prevent the leakage of manure stored there.
For decreasing the emission of ammonia the storage depots for slurry and urine must be covered. Only solid manure may be stored outside the storages, in the form of manure heaps, in the amount not exceeding the vegetation period need. For decreasing the emissions of gases the manure heap must be covered with a foil or with a layer of peat, straw or soil at least 20 cm thick. Every year the manure heap must be made in a new place.

Main regulations for plant protection:
In Estonia plant protection products are marketed 20% freely and 80% on the basis of a plant protection certificate. The plant protection certificate certifies that this person has undergone training in plant protection and may market purchase or use all types of plant protection products.

It is essential to have plant protection equipment properly installed and regulated. Only sprayers which are in order and which have been tested may be used. All sprayers must be tested every third year.

The necessary precautionary measures to be taken are:

- it is prohibited to spray in a windy weather when the wind exceeds 4 m/sec
- to spray flowering plants
- in a warm period when the temperature is over 20 °C
- in water protection zones
- beekeepers in the radius of 2 km should be warned before the spraying
- runoff of the spraying solution and rinsing water into ditches, wells and other water bodies must be avoided

The user of plant protection products must keep records of the used products.

5.2.3 Estonian Environmentally Friendly Production Scheme

Estonia has also supported Environmentally Friendly Production Scheme since 2002, when payments were made in 55 rural municipalities. In 2002, support was paid for Environmentally Friendly Production Scheme for 66,650 ha. Support in 2003 was similar to that of 2002, the only exception being the number of rural municipalities in which payments were made — 56. In 2003, support for the Environmentally Friendly Production Scheme was paid for 75,680 ha.

The measures will be implemented nationwide from the year 2004. Agri-environmental support is divided for three steps: Environmentally Friendly Production Scheme, Additional activities and Special activities.

An agricultural producer who applies for support for at least one hectare of agricultural land used by the applicant, who complies with Good Farming Practice and the requirements for the activity applied for is eligible for support. Application for agri-environmental support is voluntary for producers; upon application, the agricultural producer assumes the obligation to comply with the requirements for agri-environmental support for five years.

The general objectives of the agri-environmental support measures are:

- to promote the introduction and continued use of environmentally friendly agricultural methods;
- to preserve and promote biological and landscape diversity;

- to contribute to providing an appropriate income for those agricultural producers who manage their land in a manner that is beneficial for the environment;

The general objectives of the agri-environmental support measures are:

- to promote the introduction and continued use of environmentally friendly agricultural methods;
- to preserve and promote biological and landscape diversity;
- to contribute to providing an appropriate income for those agricultural producers who manage their land in a manner that is beneficial for the environment;
- to enhance the environmental awareness of farmers.

It is anticipated that 20–20% of Estonian farmers will join the Environmentally Friendly Production Scheme; 10% of Estonian farmers will join Environmentally Friendly Management Scheme.

General scheme of agri-environmental support:

- Environmentally Friendly Production Scheme:
  Available to every eligible farmer and a precondition for additional activities (amount of support is ~51 EUR/ha)
- Additional activities:
  - Environmentally friendly management scheme
  (support is ~26 EUR/ha)
  - Organic farming
  (support is ~70 EUR/ha)
  - Species protection projects (support is ~130
  EUR/ha)
  - Valuable landscapes (support is granted on a
  project basis)
  - Establishment, restoration and maintenance
  of landscape elements (support is ~5 EUR)
- Special activities
  - Management of semi-natural habitats
  (support 89 – 198 EUR/ha)
  - Local endangered breeds (support ~163 EUR)
  - Winter plant cover (support 6 – 13 EUR/ha)

Since organic farming support payments were first made in Estonia, the area under organic crops has increased by about 10,000 ha every year. This growth rate is expected to continue in 2004–2006, meaning that 70,000 of land should be used for organic farming in 2006.

Agricultural management is a relevant part of Estonian rural culture and it reflects our traditions and different periods in our history.

Elaborating the Code of Good Agricultural Practice is one of the phases in the process towards environment-friendly agricultural production.

5.3 Elaboration of the Code of Good Agricultural Practices in Lithuania

by Prof. Antanas Sigitas Sileka, Water Management Institute of the Lithuanian University of Agriculture

5.3.1 Present Situation in Lithuanian Agriculture

Territory of Lithuania is 65.3 thousand km^2, population 3446 thousand, of which 2332 thousand lives in cities and 1152 thousand in countryside (33.4%). Forests cover 2008.5 thousand ha (30.8%). Area of agricultural land is 3487.4 thousand ha (82% of agricultural land is drained), area of arable land – 2930.4 thousand ha, of which 919.3 thousand ha makes up cultivated grassland (31.3%). Meadows and natural pastures are on the area of 497.8 thousand ha (14.3% of agricultural land).

Average annual number of employees in agriculture is 242 thousand (17.2% of total labour force). Agriculture accounts for 7.8% of total GDP. Crop production makes 55 and animal - 45% of total agricultural production. Grain crop production makes up 23.9, milk – 20.9, livestock – 20.2 and pigs – 12.5 % of total agricultural production. Agricultural produce import share in total turnover of foreign trade is 8.0 and export - 10.1%.

Table 1. Land of farms registered in the Register of Farmer's farms

Year	Number of farms, thousand	Land area, thousand ha	Average size of a farm, ha
1996	46.9	547.7	11.7
2000	67.5	853.0	12.6
2003	39.7	604.8	15,2

Source: Anon (2002A)

Because of payments for registered farmers number farmers has increased to 262 thousand in 2004. Average size of farms is increasing. Acceleration of this process is expected when payments for early retirement and termination of farming will start.

Number of Agricultural Companies (former kolkhozes) is decreasing because of less effective production and poor management by former kolkhoz administration.

Table 2. Number and production in Agricultural Companies (AC) and state farms

Year	Number of farms	Agricultural production, thousand EUR	AVG wages, EURO per month
1997	2004	449.5	107.1
2000	963	268.8	136.1
2003	441	262.7	169.5

Source: Anon (2002A)

Area of the main crops has changed very little; some decrease can be noticed only for grain production (Figure 1).

Because of low prices for meat and milk number of cattle and pigs decreased significantly (Figure 2). From 1997 to 2003 prices for grain has decreased 32.5% and for animal products 23.5%. Despite bigger decrease prices for crop, growing of crop is still profitable especially for sugar beet. Animal production was loss making all the time. Only since 2002 some profit is noticeable for animal products because of that some increase of production can be seen.

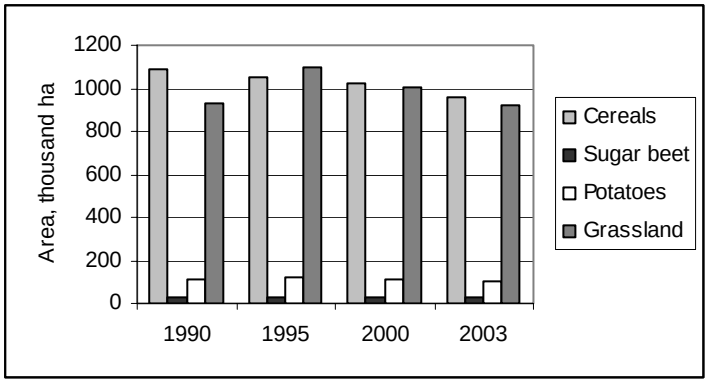


Figure 1. Changes of crop area in all farms.

Source: Anon (2002A)

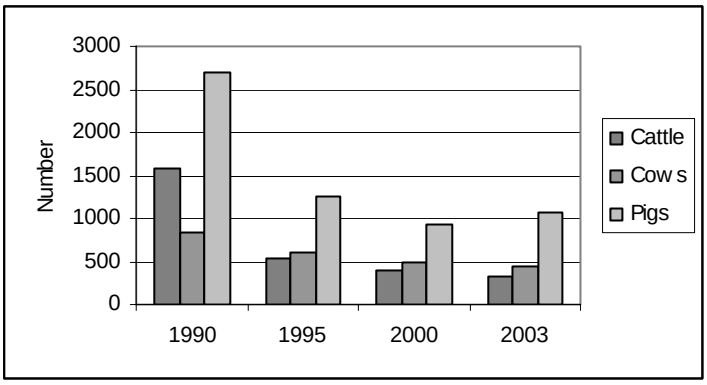


Figure 2. Changes of animal number in all farms.

Source: Anon (2002A)

Problems in agriculture The main problems in agriculture are: low wholesale purchase prices, small and dispersed farms, old, worn and ineffective technique, lack of investments for assets and fertilizers as well as low education of farmers.

Low wholesale purchase prices. Despite significant decrease in purchase prices for crop products crop production is still profitable. Profitability (profit ratio to production cost) was 8.7 % in 2002 but animal production is still loss making. Low labor cost does not cover production direct cost because of low production efficiency.

Small and dispersed farms. Ownership was restored to grandchildren of owners' in Lithuania. Because of that land was split to very small parcels and only now process of land consolidation has started. Another reason hampering land consolidation is absence of land market. Since Lithuania got EU permit ion not to sell agricultural land to foreigners seven years most of owners are awaiting international agricultural land market expecting noticeable increase of land prices.

Old, worn and ineffective technique. Most of old Russian production technique is still in use. Only 1.6% of 99.6 thousand tractors are tractors made in other than CIS countries.

Lack of investments for assets and fertilizers. Only owners of large prosperous farms can get an advantage from EU structural funds. To buy technique farmers have to pay all price and after that to get reimbursement. Poor farmers cannot get warrant for bank credits for such big money. Lack of money limits procurement of fertilizers too

(Figure 3). The amount of nitrogen used in agriculture in Lithuania per hectare of agricultural land much lower than the limits set in the Nitrates Directive.

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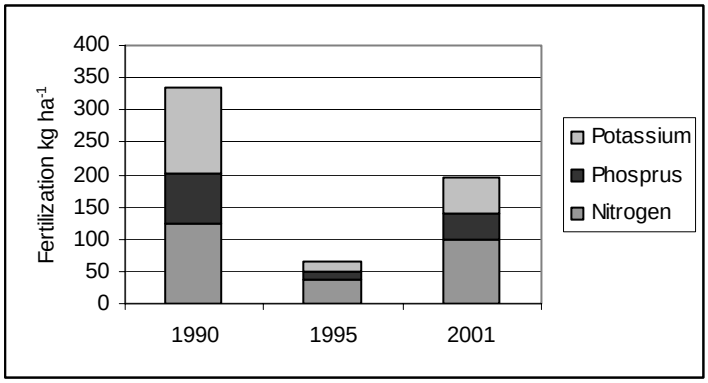

Figure 3. Fertilization kg active substance per ha cropped area in AC

Source: Anon (2002A)

Low farmers' education. Most of farmers are elderly former kolkhoz workers with very narrow specialization. Many of them now apply for payments on early withdrawal from farming. Hopefully it will accelerate land consolidation too.

5.3.2 Status of the aquatic environment

Status Report on Implementation of the 1988 Ministerial Declaration reveled that non of the HELCOM Contracting Parties had achieved the overall N and P load reduction target of 50 % to the Baltic Sea (HELCOM, 1997). Nutrient load to the Baltic Sea from Lithuanian territory is presented in the table 3.

Table 3. Nutrient load to the Baltic Sea from the r. Nemunas in Lithuania

Year	NH4-N, t	NO3-N, t	PO4-P, t
1986	3,736	14,978	5,845
1988	7,144	15,131	1,780
1990	5,273	14,727	2,972
1992	4,727	27,596	1,561
1994	7,980	32,753	1,723
1996	6,654	23,193	0,979
1998	5,727	39,661	1,128
2000	1,078	27,205	0,592
2002	1,664	37,383	1,076

Source: Anon (2002B)

Phosphorus concentration in Lithuanian rivers has decreased below eutrophication level 0,05 mg/l. Ammonium nitrogen concentration is below permitted limit 0,39 mg/l too. Meantime concentration of nitrate nitrogen has increased 2.5 times in rivers of intensive agricultural production in 1990 and still is higher than before.

The eutrophication of the Curonian Lagoon and the Baltic Sea are the main problems caused by pollution of surface waters by nitrates. These problems are recognised internationally (HELCOM, 1998). Nitrates are one of the key factors influencing the eutrophication of the Curonian Lagoon and the Baltic Sea. During the last decades the role of species of algae typical of eutrophic lakes has increased dramatically in the Curonian Lagoon. Along with a shift in the dominant species, an increase in the level of summer water blooms by blue-green algae by more than one order of magnitude has occurred. Based on this data it is concluded that the Curronian lagoon is a highly eutrophied water body. Thus the eutrophication status of the lagoon and the role of nitrates in the eutrophication are central issues in the implementation of the Nitrate Directive in Lithuania.

Analysis of available data indicates that deep groundwater in Lithuanian is not polluted by nitrates. In shallow groundwater aquifers nitrate concentration reaches 50 mg/l limit in few locations but nitrates pollute water in a number of shallow dug wells. The analysis of water quality in shallow dug wells found that nitrate concentration was high or even very high (nitrate concentration exceeded 50 mg/l in almost 37% of the wells examined).

Increasing concentrations of nutrients, particularly nitrogen, in the agricultural territories is important factors that are deteriorating environmental quality and causing negative effects on ecosystems including eutrophication.

Because of eutrophication of Curonian lagoon and pollution of shallow dug wells Lithuanian Government (2000) has undertook to implement Nitrate Directive (1991) in the whale territory of Lithuania, to elaborate Code of good agricultural practices for Lithuania (CGAP) in 2000 and to develop the Action Programme for Reduction of Nitrates Losses from Agriculture in 2003.

5.3.2 Background of the Code of Good Agricultural Practices

According to the Nitrates Directive (1991) Member States have to prepare a Code of Good Agricultural Practices that should include at least:

1. Periods when the land application of fertilizer is inappropriate;
2. The land application of fertilizer to steeply sloping ground;
3. The land application of fertilizer to water-saturated, flooded, frozen or snow-covered ground;
4. The conditions for land application of fertilizer near water courses;
5. The capacity and construction of storage vessels for livestock manures, including measures to prevent water pollution by run-off and seepage into the groundwater and surface water of liquids containing livestock manures and effluents from stored plant materials such as silage;
6. Procedures for the land application, including rate and uniformity of spreading, of both chemical fertilizer and livestock manure, that will maintain nutrient losses to water at an acceptable level.

Member States may also include in their codes of good agricultural practices the following items:

1. 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;
2. The maintenance of a 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;
3. The establishment of fertilizer plans on a farm-by-farm basis and the keeping of records on fertilizer use;
4. The prevention of water pollution from run-off and the downward water movement beyond the reach of crop roots in irrigation systems.

The CGAP has been elaborated during 1998-2000 and published in Lithuanian and English in 2001 as separate publications. The Water Management Institute of the Lithuanian University of Agriculture coordinated this project. The Danish Environmental protection agency, the Lithuanian Ministry Agriculture and the Ministry of Environment financed elaboration of the CGAP. Experts from Lithuanian University of Agriculture, Chamber of Agriculture, Agricultural Advisory Service, Farmers Union,

Association of Agricultural Companies, institutes of Agriculture, Animal Science, Agricultural Engineering and Water Management were involved in this work. Experts from Danish Agricultural advisory Service Centre provided methodological guiding during preparation of the Codes.

Two types of codes are included: mandatory rules taken from legislation and voluntary undertakings that sill are not included in Lithuanian legislation. A farmer who follows requirements of the CGAP not only improves the environment, but also achieves some profit that grants sufficiently good living standard to him.

5.3.4 Mandatory Rules of the Code of Good Agricultural Practices

When elaborating the CGAP care has been taken to define and enforce environmental requirements for newly established or expanding farms and implementation of prevention measures on agricultural land to ensure that pollution does not increase when agriculture recovers. These activities should ensure that the recovery of agriculture in the future would have a minimum impact on the environment. When providing financing for environmental investment projects it is of crucial importance to develop a system for the selection of clearly viable farms that will be able to compete in the future.

The following mandatory rules were included in the CGAP for implementation of the Nitrates Directive in Lithuania:

1. Capacity and construction of manure storages;
2. Rate and uniformity of spreading fertilizer and livestock manure;
3. Periods when the application of fertilizer is inappropriate;
4. Conditions for application of fertilizer near watercourses; Establishment of fertilization plans;
6. Crop rotation;
7. Animal density;
8. Construction of shallow dug wells for drinking water;
9. Use of plant protection products.

Capacity and construction of manure storages.

Present agricultural pressure on the environment in terms of livestock density and use of fertilisers is generally low in Lithuania. There are problems caused by pollution from large animal breeding farms (Figure 4).

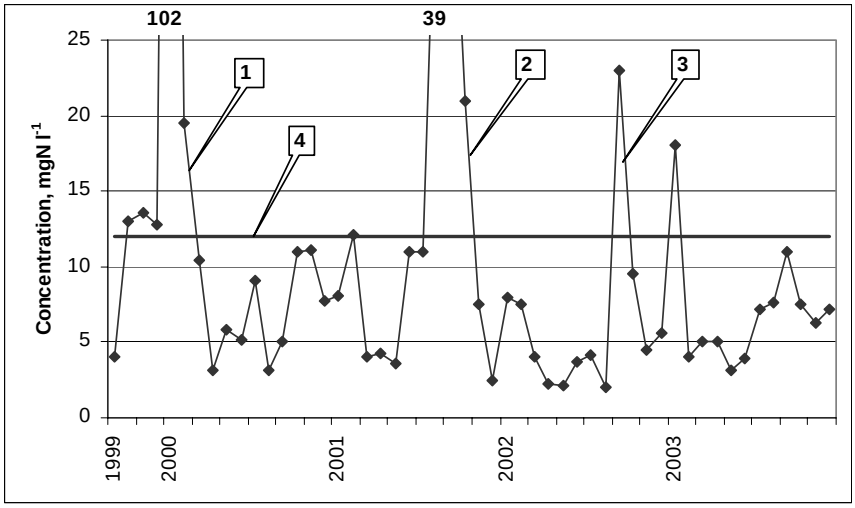

Figure 4. Total nitrogen concentration in drainage flow from barn territory: *1. Concentration before manure storage construction; 2. Concentration, when filling of the slurry reservoir was stopped; 3. Concentration after heavy rain; 4. Permitted limit.*

Before manure storage construction and when filling was stopped the total nitrogen concentration in drainage flow from barn territory exceeded permitted limit 8.5 and 3.2 times correspondingly. When manure-handling system worked properly concentration was bellow the permitted limit.

Therefore, in contrast to majority of EU Member states, CGAP in Lithuania focuses on elimination of the pollution from animal farms. The mandatory rule was transposed to the order of the Lithuanian Minister of Agriculture and the Lithuanian Minister of Environment (2003). The rule in the order postulates:

- *All the farms with more than 300 AU should establish manure storages within 4-year period after entering the EU. Farms keeping from 10 to 300 AU should establish manure storages within 8-year period after entering the EU except farms keeping animals on deep litter.Manures storage should be of such size that could contain livestock, horse and sheep manure of 6 month, whereas pigs and poultry – 8 month. Solid manure storage in farms keeping*

animals on deep litter should contain manure the same period as in farmyard manure storage.

When estimating the consequences of implementation of the CGAP, we calculated the least cost for construction of manure storages for farmers keeping more than 10 animal units (AU). Manure storage capacity and the least costs for the construction of manure storages are presented in Table 4 below.

Table 4. Manure storage capacity and financing need for farms > 10 AU.

No.	Item	Measurement units	Total number
1	Number of cattle farms	number	1450
2	Number of pig farms	number	49
3	Area of manure pads for cattle farms	thou m^2	446.5
4	Volume of urine reservoirs for cattle farms	thou m^3	472.7
5	Volume of slurry reservoirs for pig farms	thou m^3	39.8
6	Cost of manure pads for cattle farms	M EUR	22.5
7	Cost of urine reservoirs for cattle farms	M EUR	50.8
8	Cost of slurry reservoirs for pig farms	M EUR	4.6
	Total cost	M EUR	77.9

As it can be seen from the table, total investments for the implementation of the measure amounts to 78 million EUR.

Rate and uniformity of spreading fertilizer and livestock manure.

The highest manure fertilisation rate in the CGAP was determined incorporating requirement of Nitrate Directive (1991) into an order of the Lithuanian Minister of Agriculture (2004):

- *The amount of livestock manure applied each year, including manure left on fields after grazing, should not exceed the equivalent of 170 kg of nitrogen per hectare of utilised agricultural area*.

From the Soviet time there is no tradition to apply measures reducing ammonium losses from manure. To strengthen attention on reduction of ammonium evaporation after manure application CGAP demand:

- *Solid manure should be incorporated into the soil within 6 hours after application*.

Ammonium losses depend very much on manure spreading technique, especially urine, slurry and liquid manure. Russian produced solid manure and slurry broadcast spreaders do not distribute evenly manure. Rough estimates indicate that the total investments needed for the acquisition of manure spreaders is about 45 million EURO. These investment costs have depended on type of machinery available, geographical distribution of farms, and willingness of farmers to co-operate.

Periods when the application of fertilizer is inappropriate.

To reduce nutrient leaching organic fertilizer (manure, sewage sludge, composts, etc.) should be spread from drying up of soil in spring to freezing of soil in autumn when plant is growing. Therefore the mandatory rule in the order of the Lithuanian Minister of Agriculture (2004) demands:

- *Organic fertilizers should not be spread from 1 December to 15 March (on soils that are frozen, water saturated or are covered with snow). In some cases, when there is no snow and the soil is not frozen, it is allowed to spread manure in cold season.*

Conditions for application of fertilizer near watercourses. To protect watercourses from direct fall fertilizers and plant protection products during spreading and washing to stream after spreading it is very important to establish water protection strips, width that should depend on land slop steepness. The mandatory rule included in the CGAP is as following:

- *When catchment area is less than 10 km^2, width of the protective strip at streams and ditches should be:1 m – when stream side slope is < 5^o;*
  - *2.5 m - when streamside slope is 5-10^o;*
  - *>5 m - when stream side slope is >10.^{o}*

Establishment of fertilization and crop rotation plans.

There are no problems with over fertilisation in Lithuania now but to prevent soil degradation and increase nutrient use efficiency fertilisation planning for large crop farms is compulsory according the order of the Lithuanian Minister of Agriculture and the Lithuanian Minister of Environment (2003):

- *All farms having more than 150 ha of agricultural land should establish fertilization plans for all crop fields. Fertilization plan should take into account: soil type, soil conditions, slope, climate, crop rotation, desirable yield, nutrient storage in soil, soil pH, requirements of special land use conditions. Records on fertiliser use should be kept in farm record book.*

Investigations of nutrient losses showed that water quality in streams depend on ratio of grassland in agricultural watershed and structure of crops. Nutrient losses in typical Lithuanian agricultural watershed are presented in the table 5.

Table 5. NO3-N losses from different crops to drainage flow, stream water, ditch, and load from precipitation, kg ha^{-1}

Sampling site	1997	1998	1999	Total	Average
Sugar beet	17.7	38.7	13.9	70.3	23.4
Winter crop	14.8	17.6	8.8	41.1	13.7
Spring crop	23.8	37.2	19.6	80.6	26.9
Clover	16.3	10.2	8.7	35.2	11.7
Pasture	6.7	5.3	4.4	16.4	5.5
Ditch	13.4	19.2	14.1	46.8	15.6
Stream	11.6	17.6	6.9	36.1	12.0
Precipitation	4.9	1.9	5.3	12.1	4.0

It is noticeable that the least losses are from grassland. There are no problems with perennial grassland ration for all Lithuanian agricultural land in general but for some farms it is. Because of that into CGAP was included mandatory rule:

- *In farms, having more than 15 ha of agricultural land, winter crops should cover 50% area.*

To reduce nutrient losses from erosion in hilly areas preventive measures should be implemented:

- *On slopes < l 5° perennial grass have to cover no less than 35-40% of the total crop rotation area;On slopes 5-7° - perennial grasses have to cover at least 50% of the total crop rotation area;On slopes 7-10° - the area of perennial grasses has to cover at least 65-80%;*
- *When slope is 10-15° only perennial grasses have to be planted.*

Animal density.

There are no problems with animal density in the whole Lithuanian territory. Animal density does not exceed 0.5 AU per hectare but for some animal farms area of agricultural land is not sufficient. To meet requirement of Nitrate Directive (1991) for animal density Lithuanian Ministry of Agriculture and Lithuanian Ministry of Environment (2003) made recommendation of CGAP as a mandatory rule adopting an order regulating animal density:

- *Animal density should not exceed 1.7 animal units per hectare of agricultural land;When animal density is higher, one should procure additional land or to sell excess of manure to other farm, where animal density is less than the norm established*.

Construction of shallow dug wells for drinking water. Water quality in farm drinking wells is very poor in Lithuania. Nitrate concentration exceeded permitted limit 50 mg l^{-1} in 37% of examined farm wells in 1995. Testing of some measures to improve water quality in a farm with high nitrate concentration proved their effectiveness (Figure 5).

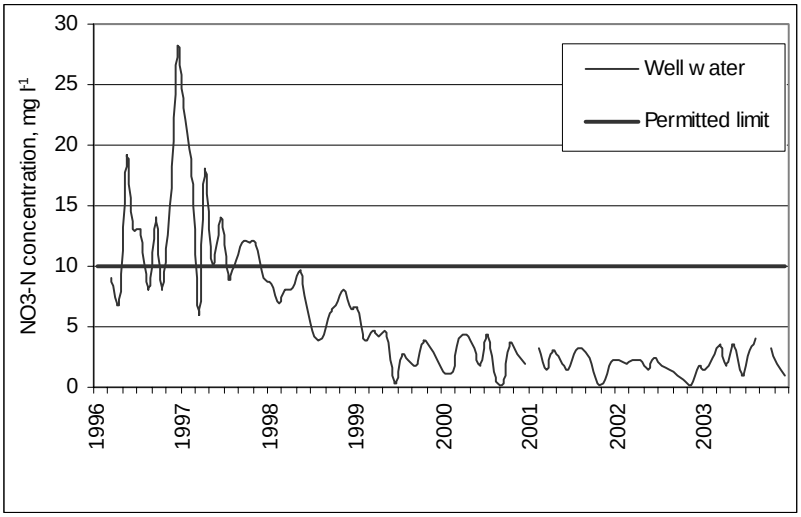

Figure 5. Water quality in farm well before and after implementation of water improvement measures.

Because of that in the order on Water protection from pollution by nitrogen compounds from agricultural sources (Ministry of Agriculture and Lithuanian Ministry of Environment 2003) were included measures on construction and maintenance of farm wells:

- *Dug well should be established in such a way that surface water or snow would not get into it;*
- *70-80cm around the well 1.5 m depth clay layer should be temped down adding 20 cm gravel layer above;*
- *Should not be any farm buildings, field toilets, slurry pits, manure piles, storages of fertiliser, pesticides and oil products as well as greenhouses and intensively fertilised kitchen gardens upstream ground water flow to the well;*
- *Width of a dug well protective zone from living house – 7m, outhouse or greenhouse – 10m, barn and manure storage – 25m. Dug well protective zone should be covered by grass.*

Use of plant protection products. Nitrate Directive (1991) does not establish requirements on use of plant protection measures but this activity can make big harm for water. Lithuanian Ministry of Agriculture has adopted the order on Requirement for Good agricultural practices (2004). There is only one but most important item concerning use of plant protection measures in this order:

- *Only pesticides that are registered in the Republic of Lithuania is allowed to use.*

List of registered pesticides is updated every year according recommendation of Lithuanian Institute of Agriculture.

Besides mandatory rules there are voluntary undertakings in the CGAP that are proposed to include in the contract when farmers apply for support from EU Structural Funds on implementation of agri-environmentl measures. The main farmers voluntary obligations are: covering of slurry stores, usage of suitable fertilization technique, sustainable usage of plant protection measures and implementation of advanced plant protection technology, undertakings for soil protection from erosion, preservation of landscape and biodiversity. Voluntary obligations are selected for every farm separately by Lithuanian Agricultural Advisory Service according farm activity, soil type, land use, topography, etc.

5.3.5 References

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5.4 Good Agriculture Practice in Poland

by Dr. Irena Duer, Dr. Janusz Igras and Prof. Mariusz Fotyma, Institute of Soil Science and Plant Cultivation, Puławy, Poland

5.4.1 General information on agriculture in Poland - Natural conditions of agriculture

Poland covers the area of 312,6 km^2, ca 31 million ha , which is 60 % farmland and 29 % woodland (Table 1). Almost the whole territory is in the Baltic Sea Basin with a very small area of the south-eastern part of the country in the Black Sea Basin. The rivers Odra and Vistula flow across the whole Polish territory and a number of small rivers discharge directly into the Baltic Sea. More than 75 % of the territory is lowland (below 200 m above the sea level) and only 3 % lays 500 m above the sea level.

Table 1. Geodesic status and directions of land use

	Thousand ha	%	Per capita ha
Total area	31269	100	0,82
Farmland	19325	61,3	0,50
Forest, woody and bushy lands	9089	29,1	0,24
Built-up and urbanized areas	1453	4,7	0,04
Lands under waters	939	3,0	0,02
Wasteland	493	1,6	0,01

Natural farming conditions are poor, due to the prevalence of light sand-derived soils and the unfavourable climate. Most of the soils have developed from loose, post-glacial rocks and only a small area is covered by soils derived from massive rocks. The soils classified as a very suitable or suitable for agriculture cover only 23 % of arable land. Those classified as of moderate suitability cover about 47 %, and marginal and unsuitable soils account for 30 % of the land. A part of the unsuitable soils are still under cultivation, but the area of set-aside land is in steady rise. The soils in Poland are commonly acid and poor in plant nutrients (Table 2). Unfertile and acid soils account for 50-65 % of arable land and only 34-50 % of soils can be rated as highly fertile.

Table 2. The fertility status of Polish soils

Soil pH and nutrient	% of soil with particular characteristics			
	pH	Phosphorus	Potassium	Magnesium
Very acid, very low	22	10	18	10
Acid, low	30	27	30	27
Slightly acid, medium	28	27	29	27
Neutral, high	15	17	11	17
Alkaline, very high	5	19	12	19
Soil fertility index*	34	49,5	37,5	42,6

*% of soil alkaline, very high +neutral,high + 1/2 slightly acid, medium

Substantial area of Poland is at the stake of erosion (Table 3). More than 50 % of the total area is at the potential risk of water and wind erosion.

Table 3. Potential risk of erosion

Form of erosion	Total area at risk		Degrees of erosion risk					
	km^2	% of total area	Low	Medium	High	Low	Medium	high
			km^2			% of total area		
Wind erosion	86332	27,6	54203	29137	2992	17,3	9,3	1,0
Water erosion	89075	28,5	43019	34455	11600	13,8	11,0	3,7

The climatic conditions are not optimum for agricultural production. The length of the growing period averages 210 days and is comparable to Scandinavian countries. During May to September evapotranspiration in Poland exceeds rainfall, resulting in a continuous water deficit, especially on light soils with low water-holding capacity. Generally, the quality rating index for the climate in Poland is ca 75-80 points, and for the soils also ca 75-80 points, as compared with the average 100 points for Western Europe. As a result of combined soil; and climate ratings, the average value of the agricultural production area accounts for 57-64 points (Table 4).

Table 4. Comparison of natural conditions of agriculture in Poland and Western Europe.

Characteristics	Unit	Western Europe	Poland
Climate	Valuation	100	75 – 80
Soils	Valuation	100	75 – 80
Climate and soils	Valuation	100	57 – 64
Agricultural land per capita	ha	0,14 – 0,85	0,27 – 0,31
Agricultural production	Cereal units	48,2 – 54,2	30,9

The above synthetic index has been used to calculate that for each inhabitant of Poland there is about 0,27-0,31(Table 3) instead of 0,50 (Table 1) of farmland, a value comparable to that of Western Europe.

5.4.2 Rural population and structure of farms

The total population in Poland is 38,5 million with the continuous decreasing tendency. According to the estimation in 2025 Poland will be inhabited by less than 35 million peoples. Poland is divided into 16 voivodships, 314 counties and 2478 communes. The total number of towns is 884 and villages about 56 000. The population of rural areas is ca 14,6 million i.e. 38,2 % of the total number of inhabitants. From this number about 8,5 million persons (22,0% of total population and 58,2 % of rural population) are living in farm holdings (above 0,1 ha each). In the last 10 years the number of people living in farm holdings diminished by about 1 million i.e 9 %. However from the total number of people living in farm holdings only 18,6 % declare farming as the solely or main source of income and 14, 8 % as the source of extra income. About 11,7 % from this group of population make their living from outside agriculture sources and 15,8 % is pensioners and annuitants. The remaining 38,9 % persons are supported by other people living in farm holdings (members of the family). From these date it can be concluded that ca 2,8 million people are directly involved in farming which corresponds to about 7 ha per 1 agricultural worker. One agricultural worker in Poland is producing food for 13 persons. Farm holders are generally poorly educated though the level of education has arisen in the last 10-15 years. Before 1990 only 1,8 % farmers had higher education and almost 50 % were graduated at primary school only while in 2002 the corresponding figures were 4,3 % and less than 40 %.

Due to historical, social and economical reasons the structure of agriculture in Poland with respect to ownership rights, size and economical conditions of farm holdings is extremely differentiated (Table 5). According to the last inventory made in 2002 the total number of farm holdings is 2933000 of which 1952000 i.e. 66,5 % cover the area above 1 ha and are classified as individual farms. The remaining 33,5 % with the area below 1 ha each are classified as the agricultural plots. With respect to numbers most of the individual farms fall in the 1-5 ha category (58,7 %) and only 10 % to the category of more than 15 ha. In term of the area small farms (1 – 5 ha) occupy about 20 % of the agricultural land and the medium and big ones (above 15 ha) almost 50 % of the agricultural land. The average size of the individual farm in

Poland is 8,4 ha and slightly increased in the last 10 years. From the total agricultural area 94,5 % is in the possession of private land holders and 5,5 % belongs to so called public sector, mainly to the State Treasury. It makes a big difference to the central planning system (up to 1990) when 75 % of the land was owned by private holders and 25 % by State Treasury.

Table 5. The number and area of farms according to size

	1990 year		2002 year	
Farm size	In numbers	In area	In numbers	In area
Number of farms, thousands			2933	
Number of farms > 1 ha, thousands, of which	2138		1951	
% of farms 1-2 ha	17,7	4,2	26,5	5,0
% of farms 2-5 ha	35,1	18,7	32,2	14,1
% of farms 5-10 ha	29,8	34,5	21,9	20,9
% of farms 10-15 ha	11,3	22,4	9,3	15,3
% of farms above15 ha	6,1	20,2	10,1	44,7
Ecological farms	-	-	1977	53515
Average farm size ha	-	7,8	-	8,4

5.4.3 Agricultural production

The structure of rural land for two representative periods of time is presented in table 6.

Table 6. The structure of rural land in 1990 and 2002 years

Specification	1990 year		2002 year	
	Thousand ha	%	Thousand ha	%
Rural area, of which Build-up rural areas			19325 569	
Agricultural area , of which	18539	100	16899	100
Arable land , of which Cropland Set-aside land	14311 14242 69	77	13066 10764 2302	77
Grassland , of which Meadows Pastures	3959 2427 1533	21	3562 2531 1030	21
Orchards	269	2	271	2

The most striking difference is in the area of cropland, which in the last 10-12 years has decreased by almost 3,4 million ha i.e. by 24 %, to 10,8 million ha in 2002.

About 2,3 million ha is excluded from cultivation and left as set-aside land. This is a quite new phenomenon in polish agriculture because before 1990 the whole area of arable land was under cultivation. In the total cropland substantially increased the area of cereals at the cost of potato and fodder crops (Table 7). The share of sugar beet, oil crops and vegetables remains practically unchanged.

Table 7. The share of basic crop groups in cropland

Group of crops	% in cropland in year	
	1990	2002
Cereals	59,9	77,1
Pulses	2,2	0,4
Potato	12,9	7,5
Sugar beets	3,1	2,8
Oil crops	3,7	4,2
Fodder crops	14,1	5,2
Vegetables	1,8	1,6
Others	2,3	1,2

The more thorough examination of the structure of cropland utilisation reveals that in the group of cereals grew the area of wheat and maize for grain and decreased that of winter rye- until recently the most popular crop in Poland (Table 8). The area of another typical polish crop-potato decreased by 1,0 million ha and the area of fodder crops by over 1,6 million ha.

Table 8. The area and share of individual crops

Crop	1990 year		2002 year	
	Area thousand ha	Share %	Area thousand ha	Share %
Wheat	2281	16,0	2414	22,4
Rye	2314	16,3	1560	14,5
Maize for grain	59	0,4	319	3,0
Other cereals	3877	27,2	4001	37,2
Pulses	52	0,3	45	0,4
Potato	1835	12,9	803	7,5
Sugar beet	440	3,1	303	2,8
Rape	500	3,5	439	4,1
Fodder crops	2018	14,2	366	3,4
Maize for silage	324	2,3	196	1,8
Vegetables	254	1,8	171	1,6
Others	288	2,0	147	1,3
Total cropland	14242	100	10764	100

The production of cereals grain, sugar beet roots and rape seeds hardly meets the internal demands for food and fodder (Table 9). The grain amount per capita is about 650 kg and in unfavourable years the import of grain, particularly high quality wheat and maize is necessary. Poland is also importer of leguminous crops grain, particularly of soya bean. The commodity market for crop products is partly balanced by surpluses of vegetables (onion, cucumbers) and fruits (apples, black currants, strawberries) which are exported in fresh, frozen or processed forms.

Table 9. Volume and yield of selected crops

Crop	Product	1988/1990 years		2000/2002 years	
		Volume thousand tonnes	Yield tonne/ha	Volume thousand tonnes	Yield tonne/ha
Cereals, of which	Grain	26492	3,13	25392	2,94
Wheat	Grain	8357	3,76	8697	3,54
Rye	Grain	5920	2,57	4232	2,26
Barley	Grain	3977	3,32	3161	2,95
Triticale	Grain	2285	3,50	2549	3,06
Maize	Grain	246	4,93	1415	6,10
Potatoes	Tubers	35137	19,0	19711	18,3
Sugar beet	Roots	15055	35,4	12644	39,8
Winter rape	Seeds	1330	2,58	992	2,25
Cabbage	Heads	1647	31,5	1599	40,0
Onions	Onions	549	19,0	654	20,2
Carrot	Roots	773	25,5	853	26,7
Beetroots	Roots	491	23,3	427	25,9
Cucumbers	Fruits	412	13,0	319	13,4
Apples	Fruits	1172	-	2017	-
Cherries	Fruits	88	-	164	-
Strawberries	Fruits	253	-	189	-
Black currents	Fruits	154	-	159	-

The main reason for food self-insufficiency in Poland is low crop yields that, with exception of sugar beets, are in the range of 50-60% of yields in " old " EU

countries. These low yields are partly justified by worse soil and climatic conditions in our country (see table 4) but are also the result of low input of qualified seeds, drought power, fertilizers and pesticides. The consumption of mineral fertilizers in the last decade almost halved to that from before 1990 (Table 10). The same concerns limestone, which is of particular worry due to the acid soil prevailing in Poland. The consumption of pesticides slightly increased, indeed in comparison to late 80ties but still does not exceed 0,8 kg of active substance per ha. The advantage is that crop products in Poland contain negligible concentration of contaminants and can be fully used for production of healthy food.

Table 10. Consumption of mineral fertilizers and limestone

Fertilizer	1990 year		2002 year	
	Thousand tonne	Kg/ha	Thousand tonne	Kg/ha
Total NPK	3029	164	1574	93,2
N	1274	69	862	46,9
P_2O_5	752	41	320	18,3
K_2O	1003	54	392	21,1
CaO	3371	182	1590	88,9

It has been already mentioned that the area of fodder crops diminished dramatically (see table 8). It is connected with decreasing number of animals, particularly of cattle and sheep herds (Table 11). The only group of animals showing a step rise is poultry, particularly the number of hens that increased almost fourfold.

Table 11 The number of animals

Group of animals	1990 year		2002 year	
	Thousands	Per 100 ha	Thousands	Per 100 ha
Cattle	10049	53,7	5533	32,7
of which cows	4919	26,3	2873	17,0
Pigs	19464	104	18629	110
of which sows	1837	9,8	1918	11,4
Sheep	4158	22,2	343	2,5
Poultry	47082	252	175075	1036
Horses	941	5,0	329	3,0
Animal units			7772	44

In spite of such changes in the number of animals the volume of basic animal products decreased less dramatically (Table 12). It can be explained by improving the efficiency of animal production. For example the productivity of one cow

increased from about 3000 litres of milk in 1990 to more than 4000 litres of milk in 2002. Even less significant were the changes in the consumption of basic food products per inhabitant of Poland (Table 13)

Table 12. Production of basic animal products

Products	Units	1990	2000/2002
Live weight total, of which:	Thous. tonne	4493	4199
Porks	thousands tonne	2341	2507
Beefs	thousands tonne	1428	573
Calves	thousands tonne	105	76
Poultry	thousands tonne	474	987
horse meat	thousands tonne	37	37
sheep meat	thousands tonne	96	6
Milk	mln l	15371	11536
Eggs	mln	7597	8209
wool	Tonne	14783	1325

Table 14. Consumption of food products per capita

Product	units.	1990	2000/2002
Cereals	kg	115	120
Potatoes	kg	144	130
Vegetables	kg	119	114
Fruits	kg	28,9	54,5
Meat	kg	63,6	62,8
Animal fats	kg	8,2	6,6
Plant fats	kg	7,6	18,4
Butter	kg	7,8	4,3
Milk	liter	241	185
Eggs	pieces	190	198
Alcohol (100 %)	liter	3,8	1,8
Sugar	kg	44,1	42,2
Cigarettes	pieces	2648	1950

5.4.4 Economical situation of agriculture

The share of agriculture in the gross domestic product GDP shows decreasing trend, from about 10 % in 1990 to less than 3 % in 2002. The main reason is unprofitable relation of the prices of agricultural products to the industrial products and services. The so called " scissors index" is shifting in disadvantage of agriculture. This bad economical situation of agriculture as a whole is translated into the situation of each farmer. From the total number of 1951 thousands farms with the area above

1 ha only 30 % declare farming as a solely or mainly source of income (Table 15) and almost 24 % make living from the labour outside the farm. Very characteristic for polish agriculture is a high share of farms which owners are pensioners and/or annuitants.

Table 15. Structure of farms* acc. to main source of income

Main source of income	% of farms in 2002
Farming	30,0
Pension and/or annuity	24,9
Labour outside the farm	23,6
Others	21,5

***** farms above 1 ha

Table 16. Structure of farms acc. to the aim and size of production in 2002

Type of farm*	% of farms
Market farms , of which	55,7
Production value 650-1100 EUR	10
Production value 1100- 3300 EUR	21,2
Production value 3300- 5500 EUR	9,1
Production value 5500-11000 EUR	8,3
Production value 11000- 22000 EUR	4,7
Production value above 22000 EUR	2,4
Self-sufficient farms	44,3

***** farms above 1 ha

All farms with the area above 1 ha can be split into two groups, market oriented and self-sufficient ones (Table 16). The majority of farms classified in the first group sell the products of the total value less then 5500 EUR per year which does not quarantee the economical resilience of the farm. The accepted measure of the farm economical vitality in Poland is the direct income surplus defined as the difference between the value of crop and animal products and the total direct production costs. According to the provisional standards e farm is recognised as economically vital if the direct income surplus is at least 4800 EUR. Unfortunately 20 % of the farms with the area above 0,1 ha accomplish this threshold level of income surplus (table 17).

Table 17. Number and share of farms acc. to economical power (ESU) in 2002 year

Economical power ESU*	Number thousands	Share %
Total **	2172	100
below 0,5	809	38
0,5-2	617	29
2-4	280	13
4-6	148	6,8
6-8	91	4,3
8-12	100	4,8
12-16	49	2,2
16-40	63	1,4
40-100	9,6	0,4
100-250	2,3	0,1
above 250	1,1	-

***** 1 ESU = 1200 EUR of direct income surplus (value of production – direct production costs)
****** farms above 0,1 ha

The support of agriculture from state budget is very low indeed due to the difficult economical situation of the country. According to the OECD date for 2002 producer subsidy estimate PSE for farmers in Poland corresponds to 14 % of the value of agriculture final production. The respective PSE figures are in the meantime 36 % for "old" EU countries, 31 % for all OECD countries and 18 % for big landowners in USA. In 2002 about 1 billion EUR i.e. 2,7 % of the total expenses of state budget was destined for subsidizing agriculture. This money were channelled toward intervention on the cereals, meat and milk markets, supporting the biological progress, controlling some animal diseases and in small part for investment in agriculture and food processing industry.

5.4.5 Polish Code of Good Agricultural Practice - Legislation relevant for GAP

Good agricultural practise is a set of rules directed toward implementation of the principle of sustainable development in agriculture. Sustainable development harmonise the economical, production and ecological objectives of farming and on behalf of the whole society is to some extent the matter of formal legislation. The most important acts and decrees relevant for GAP are presented in table 18.

Table 18. Legal acts on environment protection

No.	Legal act	Announcement
1	Act of 26 July 2000 on fertilisers and fertilisation	Journal of Laws from 2000, no. 89, p. 991
2	Act of 18 July 2001 – Water Law	Journal of Laws from 2001, no. 115, p. 1229 with amendments
3	Act of 27 April 2001 regarding environment protection, with further amendments.	Uniform text. Journal of Laws from 2001, no. 62, p. 627 with amendments
4	Act of 12 July 1995 regarding protection of cultivated plants, with further amendments	Uniform text, Journal of Laws from 2002, no. 171, p. 1398, no.238,p.2019
5	Act of 3 February 1995 on protection of forests and agricultural lands	Journal of Laws from 1995, no. 16, p. 78, with further amendments
6	Act of 13 September 1996 on maintaining cleanliness and order in municipalities.	Journal of Laws from 1996, no. 132, p. 622, with further amendments
7	Decree of the Minister of Agriculture and Rural Development of 1 June 2001 on detailed methods of applying fertilisers and conducting of training courses on the use of fertilizers.	Journal of Laws from 2001, no. 60, p. 616
8	Decree of the Minister of Environment of 1 August 2002 on the non-industrial sludge	Journal of Laws from 2002, no. 134 p. 1140
9	Decree of the Minister of Environment of 16 December 2002 on conditions that need to be met by sewage discharged to water and soil, and the substances of particular treat for the water environment.	Journal of Laws from 2002, no. 212, p 1799
10	Decree of the Minister of Environment of 23 December 2002 on the criteria of designation of waters vulnerable to nitrate pollution of agricultural origin.	Journal of Laws from 2003, no 241,p. 2093
11	Decree of the Minister of Environment of 23 December 2002 on detailed requirements for action programmes aimed limiting runoff of nitrogen from agriculture sources.	Journal of Laws from 2003, no.4, p.44

The most important for farmers are the first and fourth acts concerning the practices that, potentially might pose the treat for environment both from point and diffuse pollution sources. The acts regarding sludge and other waste disposal are also very important but luckily the vast majority of farmers does not use these products as fertilisers or soil amendments.

5.4.6 Elaboration and current status of Code for GAP

The environmental problems arising from agricultural production mainly relate to the influence on aquatic environment – both surface and ground water. Surface waters are increasingly subject to eutrophication and ground water is being contaminated with nitrate and pesticides. In the EU the Drinking Water Directive has regulated the concentration of nitrate in drinking water since 1980. This establishes a guide level of nitrate of 25 mg/l and a maximum admissible concentration of 50 mg/l.

At the same time increasing attention is paid to the relationship between agriculture and environment by the European public opinion and policy makers, although the scale of the nitrate problem is far from being uniform thorough the Community, as well as in the Newly Associated States (NAS). One of the measures which has been elaborated by EU in the framework of environmental policy is so-called “Nitrate directive” (Directive 91/676/EEC of 12 December 1991). The objectives of the Nitrate Directive are two-fold:

- to reduce water pollution caused or induced by nitrates from agricultural sources, and
- to prevent further such pollution.

The transposition of the Nitrogen Directive to the Polish law was achieved by means of the act of 26 July 2000 on Fertilizers and fertilization and act of 18 July 2001 – Water Law which entered into force on 1 January 2002, and executive decree to this act, i.e. the two above mentioned decree of the Minister of Environment of 23 December 2002. (tab. 18).

In order to achieve the objectives of Nitrate Directive, the Water Law obliges the Ministries of Agriculture and Environment to:

- Establish Code of Good Agricultural Practice,

and directors of RZGW (Regional Water Management Boards) to:

- Designate waters vulnerable to pollution with nitrates of agricultural origin and particularly exposed areas from which runoff of agricultural nitrogen should be limited (art. 47, par. 3),
- Develop an action programme for each area, aimed at limiting runoff of agricultural nitrogen (art. 47, par.7).

The first draft of the Polish Code of Good Agricultural Practice has been elaborated in 1999, in cooperation of the Institute of Soil Science and Plant Cultivation in Pulawy with the Danish Agricultural Advisory Center in Skejby. The copies of this edition (about 5000 copies) was disseminated to the farmers thorough Agricultural Advisory Centers.

In 2002 year, by charge of the Ministry of Environment and the Ministry of Agriculture and Rural Development the second amended edition of the Code of GAP has been elaborated, which was published in the big edition (20 000 copies), and still additional copies are printed. Code of GAP for protection of water, soil and air is the substantial document and contain a mixture of advice, recommendations and obligations set out on wide ranging environmental protection legislation. Poland has

issued the Code of GAP in line with the provisions of Annex II, part A and B of the Nitrates Directive and this document consists of a number of chapters and subchapters:

A. Legal regulations (Polish, EU) in the framework of environmental policy in agriculture
B. Farm organization and management in balanced agriculture
C. Water protection
D. Protection of arable land
E. Air quality protection
F. Landscape protection and preservation of bio-diversity
G. Countryside infrastructure
H. Summary of good agriculture practice principles for the implementation of Nitrogen Directive
I. Appendices.

Table 19. Overview of the Code of Good Agricultural Practice with regard to fertilization

Item / Subject	Description of compulsory items
Periods inappropriate for fertilizer application	Mineral fertilizers and manure should not be spread from 1 December until 1 March. Avoid spreading of manure in early autumn and winter
Application of fertilizers to steeply sloping ground	No spreading of mineral fertilizers and liquid manure on bare sloping ground more than 10%
Application of fertilizers to water saturated, flooded, frozen or snow covered ground	Not permitted at all
Application of fertilizers near water courses	For manure spreading 20 m untreated zone along water courses is recommended, but mineral fertilizer can be spread by hand.
Capacity and construction of manure storage vessels	In general, 6 months storage capacity is recommended. Demands for construction of manure storage.
Procedures for the land application, of both chemical fertilizer and livestock manure	Special recommendations for use of different types of manure spreaders. On bare soil, manure incorporation within 24 hours.

Table 20. Overview of the Code of Good Agricultural Practice with regard to plant protection

Item / Subject	Description of voluntary items
Integrated plant protection	Based on combining effective, environment friendly and socially accepted biological, agricultural and chemical methods.
Biological methods of plant protection	Recommendation: Optimum conditions for the development and protection of useful organisms existing in natural agricultural landscape. Application of bacteria strain based mainly on *Bacillus thuringensis* (ecological farming).
Cultural practices in plant protection	Recommendation: Crop rotation, Soil tillage, . Choice of cultivar, manipulation of crop density, spatial arrangement, seed rate.
Chemical plant protection	Recommendation: Pesticides used as supplements to cultural and biological methods, Pesticides remaining in the environment for a long period of time should be excluded. Before applying the selected pesticide read carefully the label,. never apply a pesticide without the original label,praying areas in the vicinity of water-courses drive the spayer in the direction opposite to water flow. Pesticides may be applied by trained person with sprayer having a certificate of efficiency. Pesticides may be applied on fields located at least: 5 m from public roads and at least 20 m from buildings, gardens, apiaries, herb plantation, natural reserves and parks, shorelines and surface waters and borders of protection zones of drinking water uptakes.. Never dispose of waste pesticides or spayer washings to water-courses.

Table 21. Overview of the Code of Good Agricultural Practice with regard to soil protection

Item / Subject	Description of voluntary items
Protection from water erosion	Recommendations: Lands with slopes greater than 120 should be permanently grassed or afforested, Lands with slopes between 6-120 may be used for plant production with anti-erosion treatment, On land with long slopes, up to 60 all agricultural treatments should be done across the slope, Anti-erosion crop rotation.
Protection from wind erosion	Recommendations: Creating and maintaining field hedgerows, Sustaining soil under plant cover, Soil cultivation without use of plough, plants sown immediately after tillage..
Protection from chemical degradation	Recommendations: Prevent soil from becoming too acid, or significantly exhausting reserves of nutrients, Soil reaction and content of available forms of phosphorus, potassium and magnesium in soil should be examined, at least once every 4-6 years, by Chemical Farming Station.
Protection from physical degradation	Recommendation: Ploughing layer should not exceed 20-25cm under optimum soil humidity, Different methods of soil tillage to be adjusted to various crops forming a crop rotation.
Protection from biological degradation /	Recommendation: Use of organic fertilizers and manure, plough in after harvest plant residue, Regular liming and conservative soil cultivation, Avoiding excess doses of slurry and liquid manure on soils that are too wet.

Table 22. Overview of the Code of Good Agricultural Practice with regard to biodiversity and landscape protection

Item / Subject	Description of voluntary items
Biodiversity on farm level	Recommendation: All sorts of wetlands (swamps, peat-lands or river shoreline zones) should be brought back to their natural state, Wetlands should be used extensively as natural meadows, Sustain semi-natural communities on permanent grasslands by: restoring or continuation of cattle pasturing, adjusting animals for space unit to particular site, delay of mowing and pasturing, prevention from tree or reed invasion into swampy habitat. It is forbidden to burn flora on permanent grasslands, waste lands, ditches or grass verges next to roads or railroads
Country farmstead and landscape	In general: The farmstead should harmonize with the surroundings and the farmer should feel responsible for the beauty of the environment within his direct influence, The farmers should look after the “monuments of nature” and historical monuments within the farmlands. Farm buildings should be located in accordance with the legal regulations. The farmstead should be situated in accordance with site-planning directions and sanitary programme concerning ecological policy issued by local authorities
Biodiversity on arable land.	Recommendation: Multi species crop rotation, Setting and maintenance of midfield hedgerows, Keeping fallow and idle lands in suitable condition.

Since almost 60% of total Poland’s area is used for agriculture (18 million hectares) and are affected by farmers activities, it is evident that farmers have to do

their best to prevent the environment from becoming polluted. As a rule, farmers do not intentionally damage the environment if they are made aware of the dangers. The Code is intended to be a long term investment to inform farmers about the impact of their activity on the environment and to encourage appropriate changes.

The Code of GAP has been created in order to fulfil the EU requirements expressed in Nitrate Directive, but this document as such does not constitute a set of verifiable standards as required by the Regulation (EC) No. 445/2002 of 26 February 2002 laying down 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). Article 16 of Regulation (EC) No 1257/1999 provides that farmers may receive support to offset additional costs and loss of income if they farm in areas where environmental constraints mean that they are subject to environmental protection restrictions based on Community provisions. Poland as other EU countries is obliged to implement agri-environmental programme as specified in the Council Regulation No 1257/1999. The general objective of the programme is to encourage the farmers to apply measures at protecting the environment and the promotion of nature conservation that go beyond usual good farming practice.

"Usual good farming practices" (UGFP). means the standard of farming which a reasonable farmer would follow in the region concerned. Member States set out verifiable standards in its own Rural Development Plan. These standards shall at least entail compliance with general mandatory environmental requirements. The UGFP rules must be boundly complied with by the farmer entering the agri-environmental programme on the entire area of land managed. The list of requirements and prohibitions concerning UGFP constitutes a base for entering into agri-environmental programme and is a condition of eligibility for agri-environmental payment. UGFP does not cover the whole content of the Code of Good Agricultural Practice which is addressed to all farmers in order to increase awareness and it is designated to be utilised only on a voluntary basis. Therefore, for the need of agri-environmental programme "Usual Good Farming Practice", as a separate booklet, has been elaborated by the Ministry of Agriculture and Rural Development and issued in 2003 by the FAPA.UGFP is based on the legislative provisions applicable to agricultural holdings and related to following practices :

- Natural fertilizers and their use,
- Agricultural use of sewage effluents,

- Agricultural use of municipal sludge.
- Pesticide and their use,
- Grassland management,
- Widlife habitats,
- Order and cleanliness in the farmyard,
- Soil protection,
- Water protection

5.4.7 Implementation of the Nitrate Directive in Poland

For dissemination of GAP and UGFP is responsible National Advisory Centre for Agriculture and Rural Development with its seven Regional Centres. Popularisation of good farming practices, increase of ecological awareness among rural communities as well as teaching people how to put into use the achievements of science and good advise. According to Article 4 of the Nitrate Directive Code of GAP is implemented by farmers on a voluntary basis outside the Vulnerable Zones, and is mandatory within them. Standards of good farming practices are complementary to existing legislative requirements and may be seen as a service to farmers explaining environmental legislation. GAP includes an obligation to farm in accordance with environmental legislation and takes into account new scientific knowledge which a reasonable farmer would follow, because it is beneficial for both for farmers and the environment.

Usual Good Farming Practice (UGFP) is mandatory for beneficiaries of agri-environment programme and on less-favored areas with environmental restrictions and is liable under administrative on-the-spot checks by the Agency of Restructurisation .and Modernisation of Agriculture.

GAP as well as UGFP are intended to bring the agriculture a little closer to sustainability, although current economic pressure on farmers in Newly Associated Countries do not encourage attention to environmental sustainability. When the incomes are very low the farmers main priority is to sustain his living, even if this means applying methods which are not sustainable in the long term. Agriculture can only be regulated efficiently thorough a combined use of regulation, advice and financial instruments.

Ordinances of RZGW directors on establishing particularly exposed areas to pollution with nitrates were published in voivodship journals as local legal acts by the end of 2003. The action programmes are also being prepared, along with ordinances

of RZGW directors that shall implement those programmes by the date of accession (no later than by the end of April 2004).

The basis for identification of waters polluted with nitrates of agricultural origin were the results of the National Environment Monitoring that was executed at the national, regional and partially local level. Science institutes used the monitoring date to perform expert analyses focused on the assessment of the state of pollution of waters with nitrates and the impact of agriculture on the mentioned state, with respect to the requirements of the Nitrogen Directive. The results of expert analyses were supplemented with assessment obtained in the course of research activities carried out at the end of 2002 by each RZGW, which were used to design planned borders of particularly exposed areas within water regions. The total surface of the particularly exposed areas (in the RZGW Gdańsk, Warsaw, Szczecin, Wrocław, Gliwice, Poznań) is approximatively 7760 km^2, which constitutes 2,48% of the total surface of Poland .

Currently RZGW is negotiating time-consuming element of implementation of the action programmes with agricultural entities and farmers, which result from the provisions of the Nitrogen Directive and from Polish legislation, i.e. act on the Environment Protection Law. Action plans are based on detailed Code of Good Agricultural Practice.

5.5 Good Agricultural Practice in Russian Federation

by Dr. Vladislav Minin, Euro-Asian Centre of Sustainable Development of Rural Areas, State Agrarian University of St. Petersburg

(modified Power Point Presentation)

North-western Region of Russian Federation includes

- City St. Petersburg;
- Leningrad oblast;
- Pskov oblast;
- Novgorog oblast;
- Vologda oblast;
- Kaliningrad oblast;
- Karelia Republic
- Total population is 12,4 millions
- Population of St. Petersburg - 4,6 millions

Leningrad and Kaliningrad Oblasts, they are bring the main pressure from Russia on the Environment of Baltic sea

- The common population of these two regions is nearly 7 millions, including 800 thousands population of rural areas. The agricultural employees are nearly 80 thousands, or 10% from the total population.
- There are 550 agricultural companies in this Area. Nearly 8% of them are state' but others are private organizations (cooperatives and joint-stock companies). These companies exploit nearly 1.5 million hectares of cultivated lands, including 0.8 millions of arable lands and 0.6 millions hectares of hay fields and pastures.
- These two regions produce nearly 2.4% of the total agricultural production of Russia.

Total numbers of agricultural producers in Leningrad oblast

Type of agricultural producers	Number of farms	Average acreage per farm, ha
Joint - Stock Companies	208	3200
State Farms	8	2650
Working Private farms	8800	8
Small scale farms	120000	0.5
Cottages with land	600000	0,03

Share of production of different agricultural producers in Leningrad Oblast (in %)

	Joint - Stock Companies	Private farms and population
Meat	74	26
Milk	68	32
Eggs	88	12
Potatoes	15	85
Vegetables	60	40
Cereals	98	2
Berries and fruits	10	90

System Agri-Ecological Legislation in Russia

- Federal Common Laws (Constitution; Water Code; Forestry Code and so on),
- Federal Environmental Laws (Environmental Protection; Environmental Audit; Turnover of Producer's and Consumer's Wastes and so on)
- International Conventions (HELCOM)
- Agricultural Lows (Land Code; Payments for land; Usage of Pesticides and Fertilisers and so on)
- Regional Laws
- Regulations of Ministry Of Natural Resources
- Regulations of Ministry of Agriculture

Reducing of the agricultural negative impact on Environment

a). Manure

- better feed balancing during feeding;
- using the litter in the animal' farms more active;
- inculcation of the new systems for manure removal from animal' buildings, that decreasing the ammonium emission;
- starting of commercial production of new organic fertilizers from manure (Bamil, Dried Poultry Dung and others).

b). Mineral fertilizers.

- more thoroughly calculation of the fertilizer' doze according to the soil properties;
- nutrition balancing;
- early in the spring testing the crop requirement in nitrogen application.

New Regional Concept for Agricultural Production Code of GAP for North-western region of Russia

- Basic Elements:
- Agri - Ecosystem Capacity for Technological Impact
- Software for agricultural technologies adaptation to local farm’s conditions
- New resistance and sustainable crop varieties and animal lines and agricultural technologies

Education and Internationalization

- BALTIC 21 Task Force Sustainable Agriculture
- Education is First Priority in TFSA activities

- **Target Groups:**
- Farmers and Agricultural Producers
- Agricultural Teachers and Researchers
- Specialists of different companies, related to agriculture
- Society in a whole

Leningrad Regional Agricultural Educational System

- Universities:
- St. Petersburg State Agrarian University
- St. Petersburg State Forestry and Technical Academy
- St. Petersburg State Veterinary Academy
- Retraining institutions:
- North-Western Academy of Agrobusiness
- Colleges:
- Beseda
- Vsevolozsky
- Michurinsky
- Agricultural School:
- Vsevolozsky

- Total number of students: nearly 10 thousands

The Project “Sustainable Development of Local Rural Communities in the Northwest Region of Russia”

Location:

Osmino and Rell local municipalities,

Luga district, Leningrad region, Russia

Overall objective:

Transition into sustainable development in rural local communities of the Northwest Russian region;

Specific Objectives:

1. Elaboration of the Program of Sustainable.

   Development of Local Rural Community.
2. The construction of social and economical preconditions for starting the transition of the local rural communities into sustainable development.

List of target groups

- Population of the local community, as a whole (3424 citizens);
- Local entrepreneurs (working and potential), farmers and workers of the agricultural company;
- Workers of municipal and the official bodies located in territory;
- School children of local school (305);
- Youth;
- The unemployed;
- Women;
- Persons in years;
- The tourists

The Project Products

1. The Program of Sustainable Development of local rural community will be elaborated on the base of modern foreign and Russian experience, analyze of local resources and needs of population. It will be widely discussed and adopted by local communities and it will serve for co-ordination of local administration and enterprises activities.
2. Population will be regularly and more wide informed about plans of local development as well as current local and district events. Opinion of different social groups will be collected and use for corrections in Administration activities.
3. Administration staff, enterprises, representatives of target groups from population as well as school children will get additional education and training on sustainability, environmental protection and concerning issues on how rural areas take advantage of this maintenance.

Continue the Project Products

3.2. Local bus route will be organized in order to increase mobility of inhabitants in rural communities. Assistance will be given for local farmers to develop their activities in relation with the Program of Sustainable Development of Local Rural Community.

4. The complete system of tourist's attractions and services as well as putting in order and maintenance of historical, cultural and natural memorable objects in the rural communities will generated. Personal for tourist and related services will be educated;
5. High quality and sustainable production of processed vegetables, fruits and berries, that are cultivated or gathered in the territory of the rural community, will be organised;

Two ideas that appeared in the frame of this project

- Meeting of local rural communities leaders, with representative from every Baltic Sub-regional country
- Establishment of the Association of Local Rural Communities of the Baltic Sea Region

6. The Role of Agri-Environmental Indicators in Propagation and Implementation of Good Agricultural Practice in Germany

by Almut Jering and Dr. Dietrich Schulz, Federal Environmental Agency, Germany.

Summary: Agri-environmental indicators (AEIs) are being developed in several national and international working groups and show a wide range of applications. Combined with standardized methods, target values and tolerance ranges they give valuable information on both farm and regional level. Latest developments in Germany are outlined and discussed. AEI-based systems for environmental evaluation and reporting must be transparent and allow effective application with limited manpower. They may be integrated into hitherto voluntary instruments like EMAS or ISO 14001 ff and allow an application based on farmers`own initiative and cooperation instead of command and control. A continuous improvement and environmental optimisation of all agricultural production processes is necessary to safeguard the natural resources of a sustainable agricultural production thus leaving all options to fulfil their needs not only for present but also for future generations.

Agri-environmental indicators (AEIs) are being developed in several national and international working groups and show a wide range of applications. Agri-environmental indicators (AEIs) are designed to evaluate and improve the environmental performance of agricultural activities, both on farm level and – more generalized – on regional (landscape) level. On farm level indicators may be integrated into farm management systems to improve production conditions and good agricultural practice by introducing systematic documentation and evaluation as well as the continual optimisation of all production processes.

On regional level indicators identify driving forces of environmental change, give information about the state of environmental media (water, soil, air), the atmosphere and biodiversity and show societal responses on adverse environmental effects. Thus agri-environmental indicators can become a powerful tool for unbiased scientific evaluation of trends in environmental performance, of success and failure of agri-environmental policy. The following presentation will describe the German state of the art in this field which is based on EU-legislation as will be pointed out later.

Agri-environmental indicators must meet certain criteria to be widely accepted and used. On OECD level an agreement has been reached on the criteria for the selection of AEIs as follows[1]: they must be

- Policy relevant and can be used for policy analysis
- Analytically sound (i. e. scientifically rigorous)
- Measurable (i.e. data availability and quality)
- Easy to interprete by policy makers and wider public
- Primarily geared toward national/regional level policy makers and the wider public to establish baseline trends and better inform policy-decision making

The EU has also started projects on AEIs to be used in the EU, mainly coordinated by the European Environmental Agency[2] in Copenhagen or the Statistical Bureau of the EU (Eurostat)[3] in Luxembourg.

Within the framework of the latest reform of the Common Agricultural Policy (CAP) of the European Union, Member States have to introduce farm advisory systems on a voluntary base. Germany's Federal Environmental Agency has commissioned work to develop and test an environmental controlling and optimization system for agricultural holdings[4]. The procedure was to be simple, suitable for use throughout the country (i. e. for small farms as well as for large farms), judicially verifiable (in case of a later compulsory introduction) and administratively manageable. Competent authorities with their limited resources of manpower must be able to ensure that the envisaged environmental optimization can be monitored and verified. Farms which operate in such a way that pressures on soil, water, air, biodiversity and the landscape do not, even in the long term, exceed a tolerable range are considered environmentally acceptable. The assessment is based on a core set of 6 criteria with regional or site-specific target values and tolerance ranges which separate unavoidable and agri-ecologically tolerable impacts of sustainable agriculture on one side from avoidable and intolerable impacts on the other.

[1] OECD (2002): "Environmental Indicators for Agriculture; Vol 3, Methods and Results". Www.oecd.org/agr/env/indicators.htm.
[2] The IRENA project
[3] The PAIS project (Proposal on Agri-Environmental Indicators)
[4] The final report was published in German by Federal Environmental Agency ("Entwicklung eines Umweltcontrolling-/Umweltoptimierungssystems in der Landwirtschaft"; TEXTE 17/04).

The following criteria, which are all of high environmental relevance, scientifically agreed and easy to handle, have been chosen for the environmental controlling and optimisation system on farm level:

- N surface balance
- P balance
- NH_3 emissions
- plant protection intensity
- susceptibility to erosion, and
- crop plants diversity

The work on environmental controlling was carried out in consultation with the technical committees of relevant agricultural associations[5] as well as with experts from science, the policy sector, administration and agricultural interest groups.

Some comments and explanations on the above mentioned criteria:

- N surface balance is calculated from N farm gate balance and ammonia losses (see below). N farm gate balance is easily and reliably calculated from N-input via fertilizers (including composts, sewage sludges and imported manure) and feedstuff (and – occasionally – purchased animals) and output via cash crops and animal products (and exported manure). Average N contents of agricultural products have been published within the framework (Musterverwaltungsvorschrift) of our Ordinance on Fertilization (Düngeverordnung), which is currently under revision and will be adapted to newest scientific evidence and technological development and also be brought into full compliance with the EU nitrate directive. Tolerance limits for N surface balance range from – 50 to + 50 kg N/ha; taking into account ammonia losses these values are in good accordance with the target of the German sustainability strategy, which has set a limit of 80 kg N/ha for the national “farm gate” balance to be reached by the year 2010. The actual national balance sheet comes to about 100 kg N/ha.
- P (surface) balance is calculated similar to N balance via farm gate balances. To evaluate and interprete P balance as an indicator for good agricultural practice also soil phosphorus status and soil texture have to be taken into account. Therefore soils with low P status get a negative increment[6], soils with

[5] Namely the VDLUFA (German Association of Agricultural Investigation and Research Institutes)
[6] low P status: 25 kg/ha; very low: 50 kg/ha.

high P status a positive increment[7]. Thus P balance not only shows P input and output but also the need to increase or decrease soil phosphorus status. In some areas of intensive livestock farming, e. g. in North Western Germany excessive amounts of manure have been applied in the past leading to a high or very high P status of soils, which should be decreased to optimum level by the time. The optimum value of the P-balance should be zero. Including the increment the P-balance should be between –15 and +15 kg P/ha. Soils with very high P status should not get any more P at all to get down gradually to optimum P supply. Thus application of multicomponent mineral fertilizers, animal manure or composts and sewage sludges should be restricted or abandoned on these sites.

- Ammonia emissions from agriculture are an important source for soil acidification and eutrophication in Germany, especially for forest soils. Normally they are not measured but calculated using so called emission factors. These factors indicate gaseous losses as percentage of the N excretion by the animals, depending on animal species, feeding and housing system as well as storage and spreading of manure. Details have been published elsewhere[8]. Due to excessive research work sponsored by Federal Environmental Agency Germany has also established a national ammonia inventory and a data base according to the EU-directive on national emission ceilings[9].
- Plant protection intensity is compared and interpreted statistically on a regional level according to a method developed by the Federal Biological Agency. With this method Germany is divided into a number of soil-climate-regions. For each region, each main crop and each pesticide standard application rates have been identified. Actual application rates and standard application rates are compared and summed up on a whole farm level, thus giving a set of standardized pesticide application indices (herbicides, insecticides, fungicides, growth regulators) of the farm. An extended practical test of this method is still under way. To put it simple, the farmer should be inside the standard deviation around the regional standards for herbicides, insecticides etc., otherwise there

[7] e.g. clay with high P status 8 kg/ha.
[8] Federal Environmental Agency (2002): Ammonia inventory of German agriculture and mitigation scenarios for the year 2010 (in German). Texte 05/02.
[9] Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants.

are weak points in his plant protection strategy which should be avoided by using farm advisory systems.

- Susceptibility to soil erosion may have different reasons (insufficient soil coverage, unsuitable crop rotation and ploughing, soil compaction etc.). It is calculated using the universal soil loss equation (USLE). This equation is widely established and provides techniques for numerically evaluating effects of climate, soil, topography and different farm management practices on soil erosion. Usually the topography factor (erosive length and slope) is the most difficult to evaluate. Federal Environmental Agency has sponsored a research project to calculate site specific topography factors using a GIS-programme integrating digital surface models and a digital site map of the farm (as this is not yet available in most cases, the routine application of this criterion is not yet possible). Costs range from 10 – 20 EUR/ha, but have only to be paid once. Seed grassland (soil coverage during the whole year) is regarded as the optimum with tolerance limits of soil value number/8 (in t/ha*a). Potential soil losses above 10 t/ha*a are generally regarded as intolerable.
- Crop plants diversity is not only important for aesthetic reasons (extended monocultures are monotonous and boring, making landscapes less attractive for rest and recreation and tourism) but also for integrated crop protection and biodiversity in agrarian landscapes. A modified diversity index according to SHANNON-WEAVER[10] is used as indicator for crop plants diversity to document both species number and species abundance. The index is calculated from the shares of single crops on total agricultural area of a farm. The optimum value is Hs > 2,2, which means about 10 different crops with equal shares. As tolerance limit an index of 1,25 was agreed upon by expert judgement, which would require 4 different crop species including the then obligatory 10% set aside area as fallow land.

The described environmental controlling and optimisation system (USL system) is flexible enough to integrate additional input from aspects of food safety and animal welfare and to bring it in line with the (voluntary) farm advisory system as intended by the EU´s Common Agricultural Policy. In Germany it is also used as a part of the

[10] $Hs = - \Sigma p_i * \ln p_i$

Eco-Management and Audit Scheme (EMAS)[15]. Since 2001, farms in the EU also have the option to participate in this audit scheme (developed originally for industry), by which the environmental impacts caused by farms can be reduced and transparency increased on the basis of farmers' own initiative. Thus compared with statutory law EMAS is a "soft" instrument based on cooperation instead of command and control. The indicators described above are used in the first basic step of EMAS, the so-called

- "environmental review", i. e. an initial comprehensive analysis of the environmental issues, impact and performance related to activities of the farm setting the baseline for further progress via
- the elaboration of an "environmental policy" of the farm, i. e. to set the farm`s overall aims and principles of action with respect to the environment. The environmental policy provides the framework for an
- "environmental programme", which describes the measures (responsibilities and means) to be taken.
- The farm then produces an "environmental statement" – a kind of environmental report - composed of the elements mentioned above. The environmental statement is validated by an external, independent and accreditated[11] environmental verifier and then published in an appropriate manner. It is a tool for communication and dialogue with the public and other interested parties regarding environmental performance.

The farm is then registered by the competent body, in Germany the Chambers of Commerce. The register is publicly accessible[12] and communicated to the European Commission. Farms participating in EMAS can use a specific logo developed by the Commission and use it for defined purposes (but not on products or their packaging or in conjunction with comparative claims concerning other products, activities and services). The whole process is repeated after three years.

The Eco-Management and Audit Scheme (EMAS) is limited to the European Union. On a worldwide scale, ISO 14001 is recognized much more as it can be implemented in every country world wide, so it naturally plays a more important role. Both systems,

[11] The competent body for accreditation and supervision of environmental verifiers is the German Accreditating Society for Environmental Verifiers ltd. (Deutsche Akkreditierungsgesellschaft GmbH).
[12] See www.emas-register.de.

i. e. ISO 14 001 and EMAS, have been harmonized fortunately; the environmental management system elements of ISO 14 001 have been adopted by EMAS and will allow organizations to apply both schemes, namely to progress from ISO 14 001 to EMAS without duplicating their effort. For example the Federal Environmental Agency in Berlin, Germany, has been certified according to both schemes.

The application of EMAS on farms in Germany is still in an initial state. A guidance manual for an EMAS II environmental management system for the agricultural sector was prepared in 2002 and disseminated in 2003[13]. Some pilot projects have already been carried out, albeit less in family farms than in larger holdings similar in structure to small and medium-sized industrial enterprises. The experiences from those pilot projects which have already been completed are all positive. The first participating farms have now also been registered under EMAS II. The federal states of Bavaria and Baden-Württemberg have recently started pilot projects on EMAS in family-run small farms. Thus these farms will be certified and document to comply with the environmental rules defined and to continuously improve their environmental performance according to the requirements of EMAS.

Indicators can show long-term trends in societal developments of nearly all kind. Agri-environmental indicators reflect the environmental impact of agriculture and their trend towards the better or worse. A well documented example in this respect is our national nitrogen balance, calculated as a farm gate balance with Germany as a "black box" according to a PARCOM-guideline. For this method data are available retrospectively, thus enabling to follow the trend over a long period. The results for Germany, originally published by BACH et al. within a research and development project sponsored by Federal Environmental Agency are shown in fig. . It shows a continuous increase of the N balance surplus until the mid-eighties. Since this turning point the data show a considerable tendency to lower surpluses. The same authors show that cash crop farms in Germany have already arrived at an average nitrogen surplus of about 40 kg/ha; integrated farms with both animal and plant production arrive at about 110 kg/ha surplus on average. Intensive livestock breeding still causes surpluses of about 170 kg/ha, which is – together with their ammonia emissions – one of our main environmental problems in agriculture. On the other hand

[13] Currently only a German version is available.

animal husbandry (including milk and dairy products) contributes to about 75% of farm incomes in Germany.
In its sustainability strategy the German government has set a target value of 80 kg/ha for the national nitrogen surplus (according to the PARCOM method) to be reached by the year 2010. Further on, within the UN Convention on long range transboundary air pollution[14] as well as within the EU directive on national emission ceilings[15] Germany is obliged to lower its annual ammonia emissions from 750 kt in 1990 to 550 kt by the year 2010.

Conclusions: Agri-environmental indicators can be a powerful tool for implementation and control of good agricultural practice, both on farm and regional level. Standardized methods, target values and tolerance ranges give transparent and easily to communicate informations on agriculture`s environmental performance. Long term trends can be identified on a sound scientific basis and thus provide valuable advice for agri-environmental policy. Indicator sets can be integrated into whole farm managementplans and eco-management and audit schemes. Thus continuous improvement and optimisation of all agricultural production processes can be achieved leading to a sustainable ariculture, where food and feedstuff production and environmental protection come to a balanced relationship leaving all options not only for present but also for future generations.

[14] Multi pollutant – multi effect-protocol, Gothenburg 1999
[15] Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants.

Criteria for environmental controlling and optimization on farm level

- **N surface balance**
- **P balance**
- **NH_3 emissions**
- **plant protection intensity**
- **susceptibility to soil erosion**
- **crop plants diversity**

Criteria for environmental controlling and optimization on farm level

- Methods and tolerance limits -

N surface balance	farm gate balance - ammonia emissions	 - 50 to +50 kg N/ha/a
P balance	farm gate balance increment according to soil P status	 - 15 to +15 kg P/ha/a
NH3-emissions	emission factors	50 kg N/ha/a
plant protection intensity	regional standardized application indices (statistics)	standard deviation
susceptibility to soil erosion	USLE; digital site maps; GIS programme	Seed grassland + soil value number/8; 10t/ha maximum
crop plants diversity	Diversity index according to SHANNON-WEAVER	1,25 (Target >2,2)

Calculation of diversity index according to Shannon-Weaver, example

(Hs = Σ pi ln pi)

Crop	Share of arable land (%)	pi	ln pi	pi ln pi
Wheat	30	0,30	-1,204	-0,3612
Winter barley	20	0,20	-1,609	-0,3219
Rape	15	0,15	-1,897	-0,2846
Maize (silage)	10	0,10	-2,303	-0,2303
Field grass	15	0,15	-1,897	-0,2846
Fallow land	10	0,15	-2,303	-0,2303
				-1,7129 Hs = 1,71

Stages for implementing EMAS

environmental review

↓

environmental policy

↓

environmental programme and

management system

↓

environmental statement

↓

implementation, verification, validation, registration

7. Conclusions of the Seminar Day

by Uwe Volkgenannt, Federal Environmental Agency, Berlin

Ladies and Gentlemen, at the end of this day I would like to thank once again all speakers for the excellent presentations.

During the day we got a broad overview on the agricultural sector and on the current status of elaborating Codes of Good Agricultural Practices in five countries.

We have learnt from the days´ seminar that agriculture plays an important role in national economy in all countries. Although there are significant structural differences in the agricultural sector from country to country, all countries are facing more or less the same problems as:

- Lack of modern equipment
- Low education of farmers
- Lack of investments
- Lack of infrastructure in rural areas
- Lack of support from policy makers and stakeholder

On the one hand we have four countries which will join the EU next Saturday. All these EU accession countries made tremendous efforts to fulfil the requirements of the EU legislation as well as in implementing HELCOM recommendations.

Of these four countries maybe Poland is facing the most difficulties due to expected changes of its agricultural sector. Today nobody knows exactly how far reaching and fast these changes will take place. Especially in Poland with a high number of small scale farms there will be a great need to find new job opportunities outside of the agricultural sector. Maybe one option for some parts of the country could be the further development of agro-tourism. But we should be aware that tourist are looking for an intact nature. And that will lead us back to environmentally sound agriculture.

On the other hand we have the three Baltic Countries Estonia, Latvia and Lithuania, where agriculture is important for the national economy but not as much as in Poland or Russia. All these three countries have made huge efforts to convert their agricultural systems from the old state economy to western marked standards and we can see that this is still an ongoing process. We can conclude that all countries are on a good way towards modernization of their agricultural sector. Of course, we are aware that there is still great need for investments in modern equipment as well as in farmers education in all countries.

Today we also can conclude from the presentation of our Russian colleague that also within the Russian Federation far reaching changes are expected and this – different from the EU countries - without any subsidies for the agricultural sector from outside.

Looking to the future we see a great need to

- help the new EU-Member Countries to become equal partners in the EU with the aim of implementing environmentally sound agriculture in all countries.
- and we also should assist the Russian Federation to modernize its agricultural sector towards sustainable agriculture.

Last but not least I would like to stress that the EU-enlargement is also a great chance for all countries and we should go on to assist our new partners to avoid making the same mistakes as we did in the past with the old subsidy system of the EU Common Agricultural Policy.

At the very end of a long and hopefully interesting seminar day I would like to thank once again our speakers for giving us such a comprehensive overview and I also would like to thank our colleagues and guests from other institutions for the fruitful discussion.

Thank you very much and I wish all of you a good and save journey home.

8. Contact addresses of the speakers

BALTIC SEA DAY, 28TH APRIL 2004, BERLIN

ESTONIA

Ms. Tiiu Raia	Ministry of the Environment of Estonia Toompuiestee 24 EE-15172 Tallinn	Dir.Phone: +372 6262851 Fax: +371 6262869 Email: tiiu.raia@ekm.envir.ee

GERMANY

Ms. Almut Jering	Federal Environmental Agency Bismarckplatz 1 D-14193 Berlin	Dir.Phone: +49 (30) 8903 2114 Fax: +49 (30) 89032106 Email: Almut.Jering@uba.de
Mr. Dietrich Schulz	Federal Environmental Agency Bismarckplatz 1 D-14193 Berlin	Dir.Phone: +49 (30) 8903 2885 Fax: +49 (30) 89032106 Email: Dietrich.Schulz@uba.de
Mr. Uwe Volkgenannt	Federal Environmental Agency Bismarckplatz 1 D-14193 Berlin	Dir.Phone: +49 (30) 8903 2946 Fax: +49 (30) 8903 2106 Email: Uwe.Volkgenannt@uba.de
Mr. Ewald Schnug	Federal Agricultural Research Centre Institute of Plant Nutrition and Soil Science - Bundesallee 50 D-38116 Braunschweig	Dir.Phone: +49 (531) 5962102 Fax: +49 (531) 596 2199 Email: ewald.schnug@fal.de

LATVIA

Mr. Viesturs Jansons	Latvian University of Agriculture 19 Akademijas Str LV-3001 Jelgava	Dir.Phone: +371 3029851 Fax: +371 3022180 Email: viesturs@cs.llu.lv

LITHUANIA

Mr. Antanas Sileika	Lithuanian Institute of Water Management Parko 6 Vilainiai LT-5048 Kedainiai	Dir.Phone: +370 (347) 68100 Fax: +370 (347) 68105 Email: sigitas@water.omnitel.net

POLAND

Ms. Irena Duer	Institute of Soil Science and Plant Cultivation - Department of Economical Systems and Plat Production Czartoryskich 8 PL 24-100 Puławy	Dir.Phone: +48 (081) 8863421-238 Fax: +48 Email: iduer@iung.pulawy.pl
Mr. Janusz Igras	Institute of Soil Science and Plant Cultivation -Department of Plant Nutrition and Fertilization Czartoryskich 8 PL 24-100 Puławy	Dir.Phone: +48 (081) 8863421-225 Fax: +48 Email: ij@iung.pulawy.pl

RUSSIAN FEDERATION

Mr Vladislav Minin	State Agrarian University of St. Petersburg - Agrophysical Research Institute -ul. Gusarskaya 7 RU-189620 St. Petersburg-Pushkin	Dir.Phone: +7-812-465 5870 Fax: +7-812-130 4298 Email: minin@mail.rcom.ru