FEASIBILITY STUDY AND A CONCEPT DEVELOPMENT FOR ECOLOGICAL FARMING IN THE LAKE PEIPSI/CHUDSKOE BASIN

EXECUTIVE SUMMARY

Pskov, Tallin, Tartu, Velikie Luky, 2005

Preface

This work is a subcontract within the framework of the UNDP/GEF project *"Development and Implementation of the Lake Peipsi/Chudskoe Basin Management Program",* carried out in both Estonian and Russian parts of the Lake basin.

This sub-contract is designed to prepare two feasibility study reports on ecological farming in the Peipsi lake region, aimed to evaluate the influence of agriculture on the lake basin and prepare the concept for the usage of ecological farming. Agriculture, as it is, cannot be observed without the connection to the economy sectors. Moreover, agriculture might influence nutrient load in the lake. That's why it is extremely important to study such fields as forestry, fish and animal farming. This feasibility study, and the concept for ecological farming development, should be an integral part of the Management Program for Lake Peipsi/Chudskoe so questions of interrelations among water protection measures and policies in agriculture and ecological farming are also investigated.

Estonian part of the report was prepared by the AS Andressel whereas Russian texts are developed by Kurbatova Zoya Ivanovna, Professor of Velikie Luky State Agricultural Academy. This executive summary in English is compiled using short versions of two national reports, which are available on national languages (Estonian and Russian respectively) at two project PIUs (Pskov and Tartu – please, see contact details below) and also available at the Peipsi portal (www.peipsi.org) and project web-site (www.peipsi.org/gef).

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Estonian report

EXECUTIVE SUMMARY

1. General background information and legislation on organic farming

Area of the Viru-Peipsi water management plan covers North-Eastern, Eastern and South-Eastern Estonia. Therefore 10 counties belong into this region to a greater or smaller extent. 19 towns and 70 communities entirety and 18 communities partly belongs into this region. At January 1, 2002 lived 490 thousand inhabitants in the region that is ca 35% of total population of Estonia. Surface waters of the region are rich and diverse. According to the official list of the Estonian rivers, streams and ditches (1984) there are 29 rivers longer than 50 km and 14 of them are located in the Viru-Peipsi water management region. There are also numerous lakes in the region. All together there are ca 500 lakes large than 1 ha in the region. The most important lake of the region is the fourth largest lake in Europe - Lake Peipsi with total area 3555 km^2 wherefrom 1570 km^2 belongs to Estonia.
During the last 15 years extent and character of the human impact on environment is considerably changed: industrial and agricultural production decreased, number of livestock decreased almost half and use of mineral fertilizers 3-4 times. Several big industrial plants were shut down, production of others decreased or its format was changed.

Intensive agricultural production is mainly developed in four counties of the Viru-Peipsi region: Järva, Lääne-Viru, Jõgeva and Tartu. The rest of counties would be having good prospect for organic farming. In Põlva, Võru and Valga counties site quality of soils is lowest of the region. The situation is similar in old Eastern European countries: organic farming is developed on less fertile soils. At the same time the sum of positive temperature needed for active period of vegetation is highest in the South-East Estonia. At least it is clear that land available for development of organic farming is enough especially in the coastal region of Lake Peipsi. The biggest reserve is in Jõgeva, Tartu and Põlva counties. The main obstacle of the development of organic farming has East-Viru county where soils, water bodies and air are polluted with different contaminants from mining and proceeding of oil-shale. In Valga ja Võru counties the main obstacle of development of organic farming is small demand for organic products on the spot and long distance to producers and market of organic products.

In the frame of current study organic farming is covered according to the legislation of the Estonian Republic. It defines organic farming as agricultural production and management that is environmentally sustainable and conserves natural balance according to the legislation. Main legislative acts are following:

- Act on Organic Farming (RT I 2004,6,31; 2004,32,226);
- Regulation of the Ministry of Agriculture nr 17 from 23.02.2004 Application and processing of acceptance and form of application (RTL 205,27,379)
- Regulation of the Ministry of Agriculture nr 32 from 23.03.2004 reference standard of the stamp of organic farming and rules to use the stamp (RTL 2005,38,544)
- Regulation of the Ministry of Agriculture nr 77 from 28.04.2004 Requirements for organic processing and management (RTL 2005,35,497)

The main coordinator of the organic farming is the Estonian Ministry of the Agriculture. The Plant Protection Inspectorate, Veterinary and Food Board, Health Care Inspectorate and Consumer Protection Board are supervising organizations. Organic farming is supported and consulted by 16 different organizations.

2. Organic farming in Estonian Republic

Figures, which demonstrate the development of organic farming in Estonia, are in the table 2.1

Development of the organic farming in Estonia 1999-2004

Table 2.1

	1999	**2000**	**2001**	**2002**	**2003**	**2004**
Number of producers in register	89	230	369	583	764	810
Soil for organic farming, thousands ha	4,0	9,9	20,1	30,6	42,6	46,1
Size of average enterprise, ha	41	43	55	52	56	57

The development of organic farming was the strongest in 2000 – 2003. The increase of arable land was annually 10 000 hectares. In table 1 there are data on number of producers as well as increase of arable land within period 1999-2004. These data show that growth of organic farming slowdown in 2004. Number of producers increases only 6% compared with number of producers in 2003 and workable land 8% (in 2003 these data were 31% and 38% respectably compared with year 2002). As number of abdicants of organic producers was the same 6% both years 2004 and 2003 it is possible to conclude that rapid increase of organic farming is slowdown.

On 2004, from total arable land of Estonia 5,5% was used for organic farming. At December 31, 2004 was registered 12 540 hectares as organic farming land in Viru-Peipsi sub-basin that makes up 27% from all organic farming land in Estonia. From total number of organic enterprises two third (71,5%) has less than 50 hectares and 5,5% or 4 enterprises has more than 200 hectares arable land. Cereals and vegetable are main organic farming products. Growth of berries and herbs are mostly proliferating in Põlva and Tartu counties less in Valga and Võru counties. There is relatively few organic livestock breeders.

3. Organic farming and water quality

In organic farming, synthetic fertilizers are not allowed and the nutrients input mainly originate from animal manures, green manures, the ploughing of clover-rich leys or grain legumes, leguminous leys and certain organic wastes. Nutrient inputs are lower in organic farming compared with conventional farming. Theoretically the lower nutrient inputs in organic farming systems should lead to lower leaching losses than in more intensive conventional systems. Unfortunately it isn't always so. The ploughing in of clover-rich leys in autumn, when the fields do not have any crops, which would be able to use great amounts of nitrogen increase the leaching risk. Nitrogen in organic materials can be mineralized in soil at times when no crop uptake is taking place, and as a result of it, the leaching increases. It is recommended to add organic materials with a high C/N ratio to the green manure when it is incorporated into soil (straw, for instance).

The following table demonstrates big differences in use of organic farming systems in various regions of Estonia.

Organic farming in Viru-Peipsi River Basin District (Estonian counties)

Table 3.1.

COUNTY	Agricultural land ha	Organic farming land use ha	% of agricultural land
Harju	58 409	3152	5.4
Ida-Viru	32 078	623	3.2
Järva	78 479	957	1.2
Jõgeva	65 852	1086	1.6
Lääne-Viru	90 490	1397	1.5
Tartu	68 782	3222	4.6
Põlva	46 734	1512	3.2
Valga	37 347	1950	5.2
Võru	42 808	3196	7.4

The share of organic farming systems is very small in Järva, Jõgeva and Lääne-Viru counties, where the intensity of agricultural activities is high, and the pollution risk to waters is respectively high too. Unfortunately the prices of the organic farming production are not so much higher, compared to conventional agriculture. It is the main impediment for development of organic farming in those counties.

Likely benefits to the wider environment from organic practices:

Nitrate in water. Many organic systems operate at a lower level of nitrogen intensity than conventional systems, with nitrogen inputs from fixation by legumes, or from importation of animal feed onto the farm. Organic farming adopts many of the practices that should decrease losses: maximising periods of green cover, use of straw-base manure, lower stocking densities. The body of evidence suggests that leaching losses are generally less from organic systems – though this is not always guaranteed. It might also be argued that this differential would decline as conventional fertiliser practices improve under the increasing regulatory pressure. Losses after ploughing the fertility building leys is one area of organic farming where losses can be especially large.

Phosphorus in water: The main loss pathway for phosphorus is by movement of soil particles. Leaching is a smaller and more site-limited effect. In nowadays Estonia there are not very seldom some additional "incidental" losses following the application of manure and holding the manure storages on the fields all- the-year-round. There is no direct evidence of differences in phosphorus losses between organic and conventional agriculture.

Pesticide pollution to water: Pesticide use in organic farming is very restricted. A small number of pesticides are approved for organic use. Those are copper, sulphur, natural pyrethroids, and derris. The pyrethroids, Cu and derris are only permitted for use in protected cropping or for a restricted range of horticultural crops. In particular, organic farmers do not use herbicides, some of which (such as isoproturon) have presented particular water pollution problems. Pesticide pollution from organic farming will be less common than pesticide pollution from conventional agriculture.

Ammonia: Ammonia is mainly lost from the surface of manure, either from animal buildings or hardstandings, which are soiled by manure, or during storage and handling on the field. Manure produced in organic farms often has a lower concentration of nitrogen than does conventionally produced manure. Organic systems encourage the composting of manure, which leads to the relatively high loss of ammonia. Organic pigs and poultry are likely to have similar losses to conventional outdoor units at the same stocking densities. It seems likely that on balance there is little difference between organic and conventional systems in the amount of ammonia, which is lost from the system per unit of yield, but it is likely that emissions are lower per unit area.

Nitrous oxide: Nitrous oxide is emitted from manure and from soils under appropriate conditions. Within conventional agriculture, the main risks arise from manure and from the waterlogging of soils by heavy rainfall following fertiliser application. Within organic farming the risks are likely to come from manure and from waterlogging of soils where there is a legume crop.

Nutrient balance and use: Comparison of nutrient budgets suggests that the balances can vary widely within a farming system. However, the general conclusion is that organic systems operate smaller nutrient surpluses.

There are assessment results of the nutrient losses from organic farming systems in the tables 3.2, 3.3, 3.4 and 3.5. Two main pollution distribution pathways in agriculture: pollution from diffuse sources and pollution from point sources have been analyzed. From the total loads the share of organic farming had been estimated. As there are very few investigations in Estonia, the appropriate coefficients from UK, Sweden and Denmark have been used in those calculations.

3. 1. Possibilities to reduce the leaching of nitrogen using organic farming

VIRU SUBCATCHMENT

Table 3.2

River basin	Arable land./ orga-nic (thous.ha)	N-loading from different land use cat. (t/a)				Decrease of N-load. (t/a)	
		Arable land	Meadows	Cattle-sheds	Total from agricultu-re	Organic arable land	Manure losses (cattlesheds, transport
Narva	27.9/-	19.5	6.2	0.0	25.7	-	-
Kunda	188.0/0.4	158.6	12.0	3.7	174.3	4.2	0.8
Loobu	84.6/0.2	89.0	12.5	3.8	105.3	3.6	0.8
Purtse	157.1/0.4	203.5	13.4	17.2	234.1	4.8	0.9
Selja	97.8/0.3	149.0	9.2	86.2	244.4	3.9	0.5
Pühajõgi	45.9/0.2	38.0	6.5	9.6	54.1	3.0	0.4
Padajõgi	54.2/0.2	43.2	5.6	5.0	53.8	3.2	0.4
Mustjõgi	- /-	-	-	3.0	3.0	-	-
Sõtke jõgi	6.8 / -	6.0	1.0	0.2	7.2	-	-
Other small	67.5/0.2	51.7	16.9	9.0	77.6	3.0	-
TOTAL	**729.8/1.9**	**749.5**	**83.3**	**146.7**	**979.5**	**25.7**	**3.8**

PEIPSI SUBCATCHMENT

Table 3.3

River basin	Arable land./ orga-nic (thous.ha)	N-loading from different land use cat. (t/a)				Decrease of N-load. (t/a)	
		Arable land	Meadows	Cattle-sheds	Total from agricultu-re	Organic arable land	Manure losses (cattlesheds, transport
Pedja	536.6/ 0,7	473.0		162.9	688.9	11.2	2.6
Põltsamaa	366.8/ 0,5	374.1		246.6	675.7	7.5	1.5
Ahja	186,2/ 1,5	92.3		78.0	191.8	22.5	4.5
Amme	103,7/ 1,4	59.3		43.0	111.3	21.0	4.2
Elva	191,5/ 0,8	67.7		22.3	104.4	12.0	2.4
Emajõgi	156.7 /0,7	63.0		73.5	153.7	10.5	2.0
Võhandu	24,9/2,1	115.0		41.0	181.1	31.5	6.3
Piusa	8,6/0,3	39.9		10.7	62.4	4.5	0.9
Ranna-pungerja	3.1./0,1	19.9		6.2	32.9	1.5	0.2
Kääpa	13,0/0,4	65.2		35.6	108.9	6.0	1.2
Avijõgi	3,4/0,2	41.5		27.8	75.7	3.0	0.6
Alajõgi	1,2/-	4.9		-	8.5	-	-
Other small	0,8/-	3.8		4.2	8.0	-	-
TOTAL	**222,3/8,7**	**1419.6**		**751.8**	**2403.3**	**131.2**	**26.4**

3.2. Decrease of P-loading in organic agriculture

VIRU SUBCATCHMENT

Table 3.4

River basin	Arable land./ orga-nic (thous.ha)	P-loading from different land use cat. (t/a)				Decrease of P-load. (t/a)	
		Arable land	Meadows	Cattle-sheds	Total from agricultu-re	Organic arable land	Manure losses (cattlesheds, transport
Narva	27.9/-	0.70	0.23	1.15	**2.08**	**-**	**-**
Kunda	188.0/ 0.4	2.71	0.43	6.10	**9.24**	**0.06**	**0.01**
Loobu	84.6/ 0.2	2.39	0.45	4.87	**7.71**	**0.02**	**0.01**
Purtse	157.1/ 0.4	2.79	0.49	2.01	**5.29**	**0.06**	**0.02**
Selja	97.8/ 0.3	6.56	0.38	9.80	**16.74**	**0.04**	**0.01**
Pühajõgi	45.9/ 0.2	1.40	0.23	0.92	**2.55**	**0.03**	**0.01**
Padajõgi	54.2/ 0.2	1.50	0.20	0.84	**2.54**	**0.02**	**-**
Mustjõgi	-/ -	-	0.13	-	**0.13**	**-**	**.**
Sõtke jõgi	6.8 /-	0.1	0.03	-	**0.13**	**-**	**-**
Other small	67.5/ 0.2	2.1	0.61	1.63	**4.34**	**0.03**	**0.01**
TOTAL		**20.25**	**3.18**	**27.32**	**50.75**	**0.26**	**0.07**

PEIPSI SUBCATCHMENT

Table 3.5

River basin	Arable land./ orga-nic (thous.ha)	P-loading from different land use cat. (t/a)				Decrease of NPload. (t/a)	
		Arable land	Meadows	Cattle-sheds	Total from agricultu-re	Organic arable land	Manure losses (cattlesheds, transport
Pedja	53,7/0,7	15.00	1.90	19.88	36.78	0,07	0,15
Põltsamaa	36,7/0,5	9.34	2.05	24.98	36.37	0.05	0,11
Ahja	18,7/1,5	5.90	0.90	10.93	17.73	1,80	3,05
Amme	10,4/1,4	2.46	0.27	8.16	10.99	1,68	2.82
Elva	9,9/0,8	3.26	0.60	4.06	7.92	0,09	0,16
Emajõgi	9,9/0,7	2.67	0.63	3.50	6.80	0,08	0,15
Võhandu	24,9/2,1	6.86	1.05	7.07	14.98	2,52	4,20
Piusa	8,6/0,3	2.80	0.49	1.19	4.48	0,04	0,07
Ranna-pungerja	3,1/0,1	2.73	0.24	1.61	4.58	0,01	0,02
Kääpa	13,0/0,4	1.73	0.29	5.30	7.32	0,05	0,09
Avijõgi	3,4/0,2	0.65	0.23	4.67	5.55	0,02	0,04
Alajõgi	1,2/-	0.14	0.13	-	0.27	-	-
Other small	0,8/-	3.01	0.62	1.24	4.87	-	-
TOTAL	**222,3/8,7**	**56.55**	**9.40**	**92.59**	**158.64**	**6,41**	**10,85**

4. Summary and recommendations

Development of organic farming in Lake Peipsi Basin in Estonia is supported by:

- Favourable natural and economic conditions, including financial support by government of Estonian Republic and European Union;
- Estonian Agricultural University and the Centre of Ecological Technologies are offering the best scientific knowledge and consulting assistance for farmers;
- Estonian consumers prefer the local food, in respect to production from organic farms also.

The major obstacles for faster development of organic farming in Estonia are:

- Ministry of Agriculture of Estonia has not any development plan for organic farming. It has been started just in year 2005;
- Lack of active leaders in some regions (Jõgeva and Viru counties *i.g.*) which is the main reason of falling behind in respect of organic farming;
- More effective progress is needed in development of manufacturing, environmentally friendly packing and advertising of organic products;
- It is essential to eliminate all unnecessary transactions on commission on the way from organic producers to consumers of that production, as well as bureaucratic requirements for restriction in the conditions of sale;
- Efforts in engagement of the markets in the big cities of Northwest Russia as St. Petersburg, Novgorod and Pskov is very important for organic farmers of Estonia;
- The arising living standard and environmental awareness will bring along a demand to the high-quality production from local organic farms.

Taking into consideration tendency of the development of organic farming in West- European countries it would be recommend to agricultural producers of the Viru-Peipsi sub-basin to practice more actively organic farming. If to follow draft national development plan of organic farming and main factors of success of organic farming in Austria and Scandinavian countries may recommend to the producers of Viru-Peipsi region take into account the following points:

1. To join with environmental measure. All organic farmers have to know that organic processing enables to reduce nutrient load to the surface waters and therefore reduce eutrophication.
2. To find mediator of organic products. Taking into account average size of the Estonian organic farm it may conclude that amounts of product are relatively small. Marketing small amounts itself raise expenses of unit of product. Therefore for efficient marketing of the products may be important to find trustworthy mediator who is dealing with wholesale.
3. To find processing companies of organic products. In the market there is demand for processed organic products but lack of producers'. Generally it is good situation for farmers who are interested to start processing of organic products in farm – at least in the beginning there is very small competition in the market.
4. Management of marketing. Producing organic product should be follow to marketing. Sale arguments of the organic products would be salubrity, good taste and absence of synthetic substances, and environmental friendly sound in producing and consuming of products. Enterprise is successful only taking into consideration of

consumers needs. Studies are shown that organic producers attend too little for kindergartens, schools, hospitals, nurseries, spas as well as tourism farms and hotels.

5. Increase of awareness of consumers. Producer should educate its consumers by itself. It is possible through well-developed advertising campaign (for example to show how human health is connected with food consumed etc), through introducing organic products on fairs and exhibitions. The best advertisement of organic product is stability of the quality of product.
6. Development of cooperative associations for improvement of producing and marketing of organic goods. Development of cooperative associations enables to share activities, obligations and responsibilities on producing, processing and marketing of organic products. Cooperation that base on confidence would be good presumption for successful producing and marketing of organic products.

Support of the organic farming in Viru-Peipsi region on the national level should be contain (i) development of legislation that supports development of organic farming; (ii) organizing trainings for producers and advisors on producing, processing and marketing of organic products; and (iii) organizing applied research to support organic farming with aim to collect practical information on growing organically different species and breeds. Research is needed also on growing local species and breeds as well as endangered species and breeds organically.

Russian report

EXECUTIVE SUMMARY

INTRODUCTION

The present paper is a research on the agricultural impact on the basin of the Pskov-Chudskoye Lake as well as a concept for the ecological farming on the Russian Side of the Pskov-Chudskoye Lake.

The area under consideration is the region of the Pskov-Chudskoye Lake including the four following municipal entities of the Pskov Oblast - the raions of Gdov, Pechory, Pskov as well as the city of Pskov and the three following municipal entities of the Leningrad Oblast - the raions of Kingisepp and Slantsy and the town of Ivangorod.

The research has been conducted by Velikie Luky State Agricultural Academy by request of Pskov Oblast NGO "Chudskoye Project" in the frames of the UNDP/GEF project (the UN Development Program/Global Environmental Facility) "Development and Implementation of the Lake Peipsi/Chudskoye Basin Management Programme" on the Russian side.

The goals of the present research were to estimate the state of agriculture in the Pskov-Chudskoye basin, to assess its influence on the lake in question and to develop the concept for the ecological farming in the area.

The tasks were the following:

- review the available lands in the area
- estimate the state and use of agricultural lands
- analyze the use of agricultural chemicals in the area
- analyze the distribution of forests
- present general characteristics of water bodies and determine sources of potential pollution of the Pskov-Chudskoye Lake
- show the ways to optimize agricultural landscapes
- analyze the role of individual farms in the use of available lands
- work out recommendations to develop ecological farming showing possibilities to produce natural foods in the region under study.

The paper includes the following parts:

Part 1. Review of Agriculture in the Pskov-Chudskoye Lake Region

Section 1. Geographical and Ecological Description of the Area.

A brief outline is given here as to geographical and soil zoning of the area, its forests, water-bodies, climate as well as the economic conditions and the population density.

Section 2. Land Usage Analysis.

The structure of available lands is considered here as to the land categories based on the Land Code (2001) with an emphasis for agricultural land hectarage and plough land hectarage.

Section 3. Soils and their Usage in Agriculture

Soil description of the raions of the region under study is presented here. Soil fertility is assessed and based on the monitoring data (humus content, movable phosphorus, exchange potassium, soil acidity). The variety of grown crops and the level of cattle breeding are also shown here.

Section 4. Aspects of Chemical Application in the Raions of the Area

Main factors of chemical application in the raions of the region under study are considered here as well as data on mineral and organic fertilizer application, liming and chemical plant protection.

Section 5. Forestry Use Assessment

Forests contribute to the landscape stability and water body protection. The structure of the forests available in the raions is considered here as well as the main tree species and wood groupings.

Section 6. Water Bodies and their Condition

The Pskov-Chudskoye basin hydrologic net as well as data on hydro chemical and hydro biological monitoring is considered here.

Section 7. Anthropogenic Influence on the Ecology of Water Bodies

Agricultural and industrial enterprises which may be potential sources of pollution are described in accordance with the form 2ТП of the existing reporting system used by water entities - vodkhoz. The water of the Pskov-Chudskoye Lake and the Narva and Narova rivers are analyzed. Measures to protect water bodies are suggested.

Section 8. Optimization of Agricultural Landscapes

Landscape Ecological Stability ratio is determined in accordance with biotic and abiotic factors and on the basis of efficient data gathered in the raions of the region under study.

Part II Individual Farming Tendencies

Section 1. Current State of Individual Farms in the Pskov-Chudskoye Region

Individual land ownership is analyzed as well as its segment, the number of individual farms in the raions and the amount of land they possess. Individual farming practice in the area is considered – farms' specialisation and the share they take in the overall crop and cattle production.

Section 2. Organic Farming Prospects on the Russian Side of the Pskov-Chudskoye Lake

Statistics for ecological farming in foreign countries is presented to prove eventuality and substantiate ecological farming in the area. Possible ways to develop natural crop and cattle production are suggested. Alongside the traditional ones, the following are also presented - horticulture (fruits and berries), herbs, horse breeding, rabbit breeding, poultry breeding, bee-keeping, aquaculture (breeding fish, crayfish, nutria). Certain crops and cattle breeds adapted in the region are recommended.

Section 3. Relevance of Organic Production and its Certification

Legal regulations on the organic produce in the West and in Russia are analyzed. Technology to conduct ecological production certification is presented showing the advantages and disadvantages of the process. Organic food consumer statistics is analyzed.

Part I Review of Agriculture in the Pskov-Chudskoye Lake Region

Section 1. Geographical and Ecological Description of the Area

Resume

The area under consideration is typical for the Russian North-West, with its large variety of soil types and water sources (lakes, rivers, ponds and marshes), which fragment the integrity of landscapes, leading to the loss of ecostability.

Owing to eventual climatic surges, the region is a zone of risky farming. Its population, especially in the densely inhibited towns of Pskov and Ivangorod, with the population density of up to 2000 p/km^2, is a considerable anthropogenic factor affecting the environment.

Section 2. Land Usage Analysis

Resume

While considering the area, it became evident that there are all categories of land are presented here, with the predominance of certain types in certain sub-areas. Thus, there are up to 60 per cent of agricultural lands in the Pskov and Pechory raions and up to 50 percent of forests in the Gdov, Slantsy and Kingisepp raions. Agricultural lands take up 41.3 and 32.0 percent of the available lands in the Pechory and Pskov raions respectively; in the Gdov, Kingisepp and Slantsy raions this share is 2.5-3 times lower. When treating the ratio of lands actually used for agriculture to total agricultural lands, it becomes evident that the factor is 46.5 and 37.6 percent in the Pechory and Pskov raions and only 15.6 percent in the Gdov raions, the number increasing in the Slantsy and Kingisepp raions to 30.0 and 57.4 percent respectively.

The area covered with forests on agricultural lands amounts up to 80 per cent in the Gdov raion, 60 per cent in the Slantsy raion and decreases to 30 per cent in other raions.

There are no agricultural lands in the city of Pskov, in the town of Ivangorod they take up only 4.7 per cent. More than 50 per cent of the town's territory is occupied by forest (55 per cent) and this favours the protection of the environment.

The fact that sufficiently large territories are occupied with forests, hayfields, perennials and fallow lands is to ensure the landscape stability in the Gdov and Slantsy raions and the town of Ivangorod.

Section 3. Soils and their Usage

Resume

The humus content, with an average of 1.9 %, is low only in the Gdov raion. The Pskov and Pechory raions belong to the average category, with 2.4-2.5 %. The Slantsy raion of the Leningrad oblast has a heightened level of 2.9 % and only the Kingisepp raion has a high humus level. The acidity of soil solutions points to the necessity of soil liming, especially in the Pskov oblast. The availability of nutrients in soil is average. Soils of the Leningrad oblast are in a qualitatively better state than those of the Pskov oblast. There is a tendency to crop capacity reduction and a decrease in the variety of crops under production. Cattle breeding, which depends on the productivity of crop growing also shows a decrease in the number of cattle, poultry and their productivity.

This tendency for crop productivity decrease, changes in the sown area distribution, livestock population decrease and that of cattle breeding productivity is to persist until the national economics as a whole becomes stable.

Section 4. Aspects of Chemical Application in the Area

Resume

Application of mineral fertilizers and chemical means of plant protection are potential sources of environmental pollution. The actual facts, though, show that nowadays they are of no significant role in the pollution of the environment because the application minimum is not reached. Still, the eutrophication of water bodies can be set up by any type of fertilizers, including the organic ones. The biogenic migration of elements will in any case take place, i.e. the natural movement of chemical elements takes place in the process of life activity of plants, animals and microorganisms. Biogenic elements are part of the organism body, performing vital functions (phosphorus, nitrogen, carbon, etc.). When in water bodies such substances enable propagation of cyanobacteria, increasing the biochemical oxygen demand factor and thus promoting the water body eutrophication. There are different ways, not only anthropogenic but also natural with the help of which biogenic substances get into water bodies.

Section 5. Forestry Use Assessment

Resume

One should specially mention the Gdov, Slantsy and Kingisepp raions up to 60 percent of which territories are covered with forests. There predominate valuable coniferous woods in all raions and there are 1st category woods which should not to be cut as they perform protective functions. Such woods take up half of the forest lands in the Pskov and Kingisepp raions. It is important that there are conservation wood stretches along rivers, lake shores, ponds and other water bodies. This is typical of the Gdov and Slantsy raions (66 and 51 percent of the available 1st category forests respectively). The Petchory raion has only 6.6 percent of 1st category forests, lacking conservation stretches completely. This situation should be changed. The city of Pskov requires some planting of greenery.

Section 6. Water Bodies and their Condition

Resume

The area under consideration has a developed hydrological net that is part of the Baltic Sea basin, which causes excessive humidity in this zone. The Narva river inflow into the Pskov and Chududkoye Lakes is formed here as well. The hydro chemical analyses conducted by the Federal Agency on Water Resources (The Neva-Ladoga Water Basin Department) and hydro biological monitoring data define the Pskov-Chudskoye Lake as "moderately polluted" water body of the 3d class water purity. In 2004, based on the plankton composition and its development rate, the lake was classified as the eutrophic one, as for plankton pollution indicator organisms of saprogenity, the lake should be classed as the one of the β-mesosaprogenic type, moderately polluted with organic substance.

Section 7. Anthropogenic Influence on Water Bodies

Resume

Various agricultural and industrial enterprises influence the ecological systems of rivers, lakes as well as ground waters. The Pskov oblast mostly uses subterranean water sources for consumption. Fish-breeding enterprises make use of surface water layers and water averting is performed without prior purification. Agricultural enterprises of the Pskov raion are also likely to contribute to water pollution. For example, the "Peredovik" collective farm with its cattle farm, pig farm of the "Pskov Agro Invest" LLC and JSC "Pobeda" specialising in growing vegetables may be cited as enterprises which wastes are not sufficiently purified. However, as it goes according to 2ТП reporting data, the number of agricultural water consumers is decreasing. The fresh water share used by agriculture is 0.8 and 0.04 percent in the Gdov and Pechory raions respectively, the Pskov raion takes up to 25 percent.

The main water source in the Slantsy raion is the river of Plyussa which suffers from wastes not purified to a sufficient degree. The local pollutants are JSC "Rodina", mines and the concentrating mill.

Agricultural enterprises of the Kingisepp raion make use of sedimentation tanks where organic wastes get sedimented before being carried out to the fields. Untimely evacuation, though, creates danger of pollution of the river of Luga.

Cattle-breeding contributes most (60 percent) to the biogenic phosphorus and nitrogen load in the area.

Hydro chemical and hydro biological analyses conducted on water samples of the Pskov-Chudskoye Lake and the rivers Narva and Narova showed pollution of surface waters including those of rivers flowing out of the lake. Microbiological pollution mostly takes place near dwelling places. The mentioned water body may be classified as the mesotrophic in accordance with such factors as

phosphorus, nitrite- and nitrate-ions, sulphates, chlorides as well as microbiological factors. There is no expressed anthropogenic influence of farming on the water body.

Water protective belts and greening may me offered as essential means to prevent pollution and water contamination.

Section 8. Optimisation of Agricultural Landscapes

Resume

It is of interest to consider the interrelation of territories occupied with natural and transformed ecosystems while examining conditions for the optimisation of landscapes.

According to N.F. Reimers (1990) the ecobalance is observed when the proportion between the mentioned ecosystems is 60:40. Landscape ecological stability factor (LESF1) was calculated on abiotic components (crop area and one under plant communities that have either positive or negative influence on the landscape) on the basis of actual data, on biotic elements (LESF2), using not only the area's square but also the component qualitative factor, for which an extra ratio was introduced (plough land - 0.4; pasture - 0.68; vegetable garden - 0.5; forest - 1.0, etc.). The LESF1 factor pointed to the "relatively stable condition" for the considered raions, except Gdov for which it turned to be "stability well expressed". The LESF2 factor pointed to various degrees of the "stable" condition for all raions, the Pechory and Pskov ones being in the end of the list.

The mentioned factors provide basic data on the ecological stability level for the landscape in question, necessary to choose a strategy to take protective measures or reshape the landscape.

PART I. CONCLUSIONS

1. The area under study is typical for the Russian North-West, with its large variety of soil types and water sources (lakes, rivers, ponds and marshes), which fragment the integrity of landscapes, leading to the loss of ecostability.

2. Owing to eventual climatic surges, the region is a zone of risky farming.

3. There are all categories of lands in the area. However, agricultural lands in the Pskov and Pechory raions predominate (up to 60 %); in the Gdov, Slantsy and Kingisepp raions up to 50 percent take up forests, which favour the stability of landscapes.

4. Plough land area index varies in different agricultural enterprises and may be up to 70 percent of the total agricultural lands, thus showing the eventuality of erosion and nutrient wash out.

5. As for soil fertility, it has been determined that the Leningrad oblast's soils are in a better state than those of the Pskov oblast.

6. There is a general tendency for the reduction of crop variety grown in the area and a decrease in crop productivity, which negatively influences the development of cattle breeding.

7. It also has been shown that carrying-out of nutrients with crop exceeds the input with mineral and organic fertiliser application, thus attesting to the fact that farming doesn't influence the degree of water body eutrophication.

8. To improve the soil structure and optimise the soil solution one needs to lime more than half the plough land.

9. The pesticide load amounting to 0.03 kg/ha in 2004 can have no polluting effect on the environment.

10. The Gdov, Slantsy and Kingisepp raions lead in landscape protection with woods (up to 60 percent of the area), they also include some nature conservation forests of group 1 stretching along river banks and lake shores. The city of Pskov requires additional greening.

11. The hydro chemical and hydro biological monitoring data make it possible to classify the Pskov-Chudskoye Lake as a "moderately polluted" eutrophic water body slightly polluted with organic substances, the water purity class - III.

12. Both agricultural and industrial enterprises influence the lake and river ecosystems as well as underground water.

13. Water analyses conducted at seven points of the Pskov-Chudskoye Lake and the rivers of Narva and Narova showed certain degree of pollution. However, there is no pronounced biogenic influence on water on the part of agriculture. The Pskov-Chudskoye water body may be classed as a mesotrophic one.

14. The landscape ecological stability factors (LESF1) based on abiotic components pointed to "stability well expressed" in the Gdov raion and "relatively stable condition" in others. The factor based on biotic components defines the condition as variously "stable" in all raions, the Pechory and Pskov ones being in the end of the list.

15. The agricultural production level in the area is typical for the non-black soil zone. A considerable part of the plough land is under forage crops, especially perennial grasses, thus utilising at the utmost the agronomic and climatic conditions of the area and favouring soil fertility. Many farms specialise in grain growing, the productivity of which has dramatically reduced.

16. As the analysis prompts, to prevent grain and perennial grasses productivity decrease one may change over to natural production technologies in the area. To do this, one needs to reconsider the crop rotation systems which are to be based on crop change. Legumes are to take up to 30-45 percent in the crop rotation system. The systems on the multiple-field basis are to be preferred. Local seed-farming for perennials (clover, alfalfa, sweet clover, cereals) as well as leguminous crops (peas, lupine, and vetch) should be established.

17. Crop systems with legumes are to improve the availability of nitrogen for crops, thus decrease the application rate of nitrogen fertilisers to 30-40 kg/ha for cereals and to 60 kg/ha for tilled crops. Eventual grain productivity might come to 25-30 centners/ha, allowing with that satisfactory capacity of tilled crops which, still, require organic fertilisers at the rate of 20 tonnes/ha.

18. As the better part of land (50%) on a farm possess on the average 2.5 percent of humus and an average content of Ph and K, the application of respective fertilisers is unlikely to increase prodcudtivity substantially. Thus, nitrogen and potash fertilisers may be reasonably applied.

19. Soil cultivation systems are needed to allow maintenance of agrophysical soil properties and favourable phytosanitary state on the field in energy-efficient ways. Tillage is appropriate for leguminous crops and spring grains which require loose soil and are likely to be affected by pests. Surface soil treatment is advisable for winter crops, oats and oats-and-vetch combination.

20 Agrotechnical methods as well as use of resistant and early-maturing crops are options for plant protection chemicals.

21. At present, farming is to combine the organic methods and a moderate application of chemicals, which ensures the environmental protection to enable the organic high-quality products and raw materials.

Part II. Individual Farming Tendencies

Section 1. Current State of Individual Farms in the Pskov-Chudskoye Region

Resume

Land plots are granted to individual farmers (both to legal entities and private proprietors - citizens using land to produce agricultural products) as ownership, inheritable ownership, usufruct and lease. In the Pskov raion 70 percent of land is granted as ownership, in the Gdov raion - 45 percent and in the Kingisepp raion - 58 percent.

Agricultural lands constitute up to 90 percent, more than a half being plough land. Most of the land is used for agricultural purposes. Individual farmers' share practically in all raions is less than those of plot owners and gardeners. Gardens in all raions but the Pechory one take 20-27 percent of the total land used by citizens for farming, in the town of Ivangorod gardens take 67.7 percent. Only the Pskov raion is noted for cattle breeding use of agricultural lands. Despite the large number of registered individual farms, their number has reduced by half and even more. Individual farmers produce no more than 10 percent of grain. In the Slantsy raion grains are cultivated exclusively by state farms, individual farms, though, output about 64 percent of potato and vegetables, the latter requires a lot of hand work. Farms are becoming specialised. Potato productivity on individual farms is twice as high as on the state ones. Individual farms take no more than 1.4 percent share in cattle breeding and about 14.8 percent in pig breeding in the Kingisepp raion, the Slantsy raion and those of the Pskov oblast follow. State support for individual farmers is a priority, as Minister of Agriculture Mr. Gordeyev A. wrote in his article titled "State support for small businesses" (2005).

Section 2. Organic Farming Prospects on the Russian Side of the Pskov-Chudskoye Lake

Resume

Natural farming has been developing in the world during these 10-15 years, organic farming being one of its branches. Positive results achieved abroad substantiate the development of ecological farming in this country, and in the region of the Pskov-Chudskoye Lake in particular. Ecological farming presupposes refusal of mineral fertilisers and pesticides to enable production of non-polluted crops and growing healthy stock without chemicals and food supplements. The main disadvantage on the way is certain reduction of productivity. However, taken that nowadays the grain productivity is 7 centners/ha in the Gdov raion, up to 18 centners/ha and to 23 centners/ha in the Leningrad oblast, the production reduction is of no adverse effect. Organic fertiliser and siderate application also require material spending. What's more, payback is not immediate. To develop ecological farming on the Russian side of the Pskov-Chudskoye Lake, one may recommend crop rotation systems based on crop change while taking into consideration natural resources of the area. In addition to traditional crop growing and cattle breeding systems the following branches may be recommended for ecological farming - horticulture (fruit and berry), herbs for medication, horse- , rabbit- and poultry-breeding, bee-keeping, aquaculture (fish, crayfish, nutria). Certain species of crops and animals suitable to natural and climatic conditions of the considered area have been proposed.

Section 3. Relevance of Organic Production and its Certification

Resume

In order to get ecologically clean products with the use of biological system of agriculture it is necessary to develop personal farms massively. They, in turn, will be interested to sepcialise in step by step increase of production of agricultural output.

At the first stage the farmers usually have crop production (forage for cattle), at the second stage they use this forage to get ecologically clean production from cattle breeding, at the third stage they process cattle breeding products. This must be proved by ecological certificates. It is possible but only with the financial support of the government.

Mentioned above activities will help to promote the sustainability of the agricultural landscape, decreasing of pollution of water bodies, development of farms and getting ecologically clean production.

Part II. CONCLUSIONS

1. To use lands efficiently, farmers should have a possibility to increase their land plots by purchasing land as property, many farmers do not trust in land leasing, thus making use of land with no high hopes for the future.

2. As it has become evident, there is a tendency for individual farm specialisation, especially when farming requires much hand work (vegetable growing). Specialisation leads to improved production methods, higher productivity and increase of the product share both in crop growing and cattle breeding.

3. With consideration to the changes in the sown area structure and the decrease in the variety of grown crops, individual farm speciality should follow natural and climatic conditions of the region as well as the market demand. Potato and vegetable growing (both in open and covered soils) and perennial grasses may be dominant activities. If a farm is busy breeding cattle, it is cheaper for it to purchase feeds on specialised farms, as it is done in foreign countries. Grain growing may be left entirely to still available state farms that have large hectarage, machinery and able to purchase herbicides, to correctly set up crop rotation systems, to machine-harvest and to treat grain and straw afterwards. Typical for this region is winter and spring grain "over-wetting"/"freezing-out" depending on the weather. So, it is more profitable to buy forage grains somewhere else.

4. Taking into account the world ecological farming experience, this process on the Russian side of the Pskov-Chudskoye Lake is possible and promising if one gives proper weight to the area's natural resources and climatic conditions.

5. Every individual farm should be proposed 1 or 2 agronomically valid crop rotations based on crop change as the factor of ecological farming. Refusal of fertilisers and pesticides is to enable non-polluted crops and consequently high quality cattle products.

6. Non-traditional branches are to be developed to widen farming variety and produce organic products.

7. State support is of need to individual farmers both at federal (legal regulation and target programmes) and local levels (land plot increase, assistance to determine the best farm specialisation).

8. It is quite possible to produce organic products in the area under consideration and the shortest time is required by raions of the Pskov oblast where nowadays, unlike in the Leningrad oblast, they hardly apply fertilisers and pesticides. However, without a solid legal basis and state support, the transition is sure to drag on for years.

CONCLUSIONS

1. The conducted analysis makes it evident that in agriculture of the area, state farms undergo a process of decay, the application of fertilisers and plant protection chemicals is insignificant. There are practically no soil liming and reclamation works done. The variety of harvested crops and their productivity are decreasing, livestock population is going down. There is no observed biogenic influence of local agriculture on the Pskov-Chudskoye Lake.
2. The present state of things in the area favours ecological farming, which will enable the development of modern promising methods of crop - and animal-breeding, organising the farming process scientifically and setting an example for foreign countries. State subsidies might be used to purchase expensive machines, pay for certification, compensate losses in case of adverse conditions of the "risky farming zone".
3. Individual farms are unlikely to substitute large state farms in the nearest future, their main task is to produce organic products. This is a strategic line for small individual farms, which will increase their role in the national agriculture.

4. Farming certification mechanism is to be worked out for the area, in which practically all agricultural products are ecologically safe, but there are no certification procedures to prove that. So, such a mechanism is a priority and the time is coming when foreigners are sure to line up for Russian crop-, animal- and fish products.
5. Foreign, particularly from neighbouring EU countries, investments may be attracted for the development of ecological farming branches and production of organic foods, if foreign partners are interested in ecological farming and non-polluted water bodies.
6. Stable and sustainable development of farms requires a system analysis of their activity to show trends. So, a constant farm monitoring is to be conducted as well as a periodic analysis of their role in the area, forming a respective data base.
7. It is a mistake to aim organic products exclusively for the well-to-do people. Infant foods industry is to become the main consumer for such products. To back it up, a respective legal basis should be worked out, if one proceeds with the fact that the health of the nation and the health of the future generations of citizens is the priority.
8. To back up the farming market, the state should concentrate on building up the market infrastructure - wholesale food markets, credit and service co-operatives, veterinary clinics, leasing and insurance companies and similar structures as well as help strengthen integration of farming and other branches.

Concept of Ecological Farming on the Russian Side of the Chudskoye Lake

To pass on to ecological farming, it is important to evaluate potential of various farming options under present economic, soil and climate conditions. Furthermore, it is necessary to decide on the ecological farming branch to practice.

As it has already been mentioned, priorities in ecological farming are to maintain the declining soil fertility and to produce physiologically valuable products in an energy-saving way. Taking into consideration the fact that organic food market is under formation in this country nowadays, it is of special importance to set up ecologically clean food farms and to work out programmes for them to adapt to new production methods.

For a farm to start using organic methods, it should begin with analysing possibilities within the farm itself. Structural, economic, ecological, soil and climatic factors are to be dealt with in this respect.

Dealing with structural and economic issues, one should consider data on the total available hectarage and agricultural lands. Organisational form, remuneration system and availability of workforce should also be fit here. Economic analysis should include gross output costs, production assets, crop productivity, productivity of labour, costs and profitability, sales and transportation channels.

Basing on ecological farming standards (IFOAM, EcoNiva, Naturland), one may define the following criteria applied to ecological farms:

- The farm's territory should be in full compliance with environmental requirements. Thus, it should not have any sources of atmosphere, water and soil pollution, such as industrial enterprises, nuclear power stations, motor- and railways. Cattle barns and warehouses should not be situated closer than 250-300 meters from water bodies.
- Fields for organic crops should be separated from traditional ones with a buffer zone of 15-20 meters. Only organic phosphorus and potassium should be allowed (phosphates, kainites, dolomites, feldspar, granite powder and other crude minerals as well as substances listed in

standards). Wood ash, bird excrements and mushroom growing residues are also allowed in limited quantities.

- To increase and maintain soil fertility no less than 30 percent on fields on natural farms they should be occupied with leguminous crops and those that improve physical and phytosanitary soil properties and contribute with available nitrogen. It is recommended that crop rotation systems should include siderate crops for green manure (lupine, vetch-and-oats mixture) as well as intermediate, mowing and stubby crops. Leguminous crops have a deep footage that makes use of additional nutrients from lower soil layers.
- Crops cultivated should be well adapted to local conditions and be highly resistant. Genetically modified species and breeds should not be used.
- Chemical and synthetic substances should not be used for plant and weed control. Growing sound crops is based on certain control measures that include:
    - Optimised crop rotation systems
    - Thorough soil cultivation
    - Compost use
    - Growing resistant to weather species and sowing strong seeds.

Agronomic, mechanical, thermal and biological methods as well as substances authorised by standards should be used.

- Cattle breeding organic farms should exclusively use feeds of their own origin or purchase them from other ecological farms. The feeds to be purchased should strictly correspond to the respective standards.
- Farm managers and workers should be well acquainted with ecological farming methods and consistently implement them in their practice. Regular briefings should be conducted to inform workers of the production process, which is of particular importance at the initial stages of changing to the ecological production.

Only after a careful analysis of the farm's options and specialisation choice the farm could be considered ready for ecological production.

There are several stages to be gone through while changing to ecological production:

1. Farm's resolution to convert to ecological farming
2. Forming a paper package necessary to work with a certifying body.
3. Conversion process itself
4. Production certification and getting the Certificate and the License on using the mark of standard conformance.

Having made the decision the farm should compile the package of documents on the basis of which the cooperation between the farm and the certification organisation on conducting certification procedures is being done. It comes from practice that our managers tend to more traditional production forms. They do not want to take risks connected with changes and tradition break; in fact they are afraid to step over the so-called psychological barrier. Conservatism is inherent in human psychology and the new ways and means are inevitably connected with a certain break of traditional way of thinking and acting.

The farm itself should decide the acceptable level of ecological farming. The options are as follows:

1. Complete change of the farm to ecological production
2. Change of one branch of production of the farm (crop growing or cattle breeding)
3. Change to ecological farming of just one internal unit of production of the farm
4. Change to ecological farming of the production of one crop of one type of cattle.

After the decision to change has been taken, the farm takes care to file papers regulating the interrelations between the farm and the certifying body. As it has already been mentioned, the JSC «EcoNiva" is such a body in Russia. Though, a similar organisation may be set up for each region. For example, "ECOEXPERT", the Development Center for Ecological Farming Certification has been set up in Velikie Luky raion of the Pskov oblast.

Farms and certification bodies co-operate on a contractual basis and sign the following agreements:

- Protocol on Intentions (about switching to ecological farming)
- Inspection agreement
- License Agreement
- Marketing Assistance Agreement

When the farm starts the switch, «Farm Questionnaire» is the main document issued by the certifying body before the above-mentioned agreements are signed. This paper provides exclusive information on production and financial activities of the farm. The important Questionnaire information is about the field history, showing the degree of chemisation of the fields to be certified.

If the farm plans to process ecologically safe raw materials, "Processing Enterprise Questionnaire» is to be filled in, providing the description of manufacturing methods and equipment as well as raw materials and product storage conditions.

The "Questionnaire" is an important stage of certification, inspection efficiency and length, which depend directly on the completeness of information provided in the paper and in its turn it affects the objectivity of the certifying body.

Farms themselves pay for the work done by a certifying organisation. After agreement is signed the farm enters the conversion period, i.e. the period when production methods complying with ecological production standards are being employed. The length of this period directly depends on the degree of soil pollution with chemicals, which is stated in the «Questionnaire". The higher is this degree, the longer is the conversion period. It might last from 3 to 5 years. Conversion is done under the guidance of an advisor appointed by a certifying body.

It is very important to correctly choose a commercial crop. As a rule, it is chosen in accordance with market demand and local market capacity. The natural commercial crop is included into a crop rotation system worked out in accordance with the standards. The new crop rotation is required because of changes in the sown area structure and on-farm organisation of the land use. All this requires additional spending, that is why a business plan is to be made up while converting to ecological farming. Organic product production and sales volumes are planned on the basis of the business plan. In addition to the License Agreement, the Agreement on production and sales is to be signed. It is needed for market monitoring and trade mark protection. The farm is also to decide on the sales system:

- direct sales (on-farm sales, weekly sales in the market place, a proper town shop, mobile shops);
- sales through a producer association;
- wholesale and specialised shops;
- retailing through conventional food stores.

The conversion is inspected annually by the certifying body which is to decide on the conformity of the «Questionnaire" information to the actual state of things and whether respective standards are observed. If the farm follows the requirements of the certifying body, the former is granted the status of organic producer and is issued the Certificate of standard conformance to ecological production standards and the License to use the trade mark of "Natural Product". The latter

term means that not only the end product but the production itself comply with the standards. The mentioned trade mark issued by the certifying body is a kind of a business card of the producer.

The Certificate and the License are valid for the period of certification unless the certifying body decides otherwise. The validity of the Certificate and the License may be suspended or terminated if it is for certain that the product certified does not comply with the accepted certification criteria.

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