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Ukrainian Agriculture and Agri-Environmental Concern

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Abstract

This paper presents an overview of the development of macroeconomic conditions in Ukrainian agriculture from 1990 to the present, and highlights the main features of land privatization & farm reorganization that have strong impact on the environment. In this regard, the review describes the major agri-environmental issues drawn from national Ukrainian datasets accompanied by a discussion of the potential development.

The paper consists of several parts[1]: 1) the country's general characteristics and overview of the Ukrainian agriculture; 2) the macroeconomic situation of the Ukrainian agriculture in the 90-th to the present; 3) land reform and reorganization of the farm sector; 4) environmental situation in the Ukrainian agriculture; and 5) agri-environment concern and policy response. All these parts primarily refer to the latest international and national repots, publications and cases in Ukraine before and during the transition period.

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The country's general characteristics

Ukraine is a unitary state in Eastern Europe. For the territory (603,6 thousands square kilometers) and the population Ukraine (46,45 million people) is the biggest country in Europe: its territory (95% mostly flat) ranks second place after the European part of Russia, while its population is smaller only to the population of Germany, Great Britain, France, and Italy.

The country is divided into 25 regions and Autonomous Republic of Crimea, which include 457 cities (5 of them have a population more than 1 million people), 885 towns and 28,6 thousand villages.

The GDP (gross domestic product) per capita (PPP) in 2006 was $7,600 (est.), that is one of the lowest in Europe. However during the last 6 years Ukraine demonstrated constant increases in GDP per capita.

The structure of the economy in 2006 was as follows: 42.7% of the GDP is contributed by industry (incl. 25% by manufacturing), 40% by services, and 17.5% by agriculture and forestry. According to the president of Ukraine V. Yushenko Ukraine still has a deformed structure of the economy: the fuel and raw resources branches dominate and badly influenced on environment (www.president.gov.ua).

Brief overview of the Ukrainian agriculture

Historically, more than 2/3 of the Ukrainian territory is used for agriculture; 17,4 % of the land is covered by forests, 12,1% is under the settlements and infrastructure facilities (e.g. built up lands, houses, roads, railways), 3,3% is unused land (e.g. open land), and 4% is covered by water.

Ukraine owns the biggest agricultural area in Europe of about 48 million hectares that is good for large scale farming. More than 76% of agricultural land is used for arable farming. Pasture and grazing land take up 18%, permanent crops (such as vines) occupy about 2% of agricultural land.

The important feature of Ukrainian agriculture is that most of the farmland (half of arable land) has extremely-fertile soil - black soils with enriched humus: called "chernozem". According to the Institute of Soil Science different types of chernozem occupy almost 60% of the whole territory.

These soils are well suited for the large-scale cultivation of extensive agricultural crop, especially grain crops, sugar-beet (forest-steppe zone), long-fibred flax (forest zone), wheat, sunflower(steppe). Besides, it produces potatoes, vegetables, fruits, grapes and others. Although cropland is good for large-scale farming, one of its main drawbacks is a high level of erosion.

Due to its favourable climate and rich soils Ukraine is a large agro-industrial country. Agriculture employs 4,7 million people that is about 20% of the labour force of Ukraine and makes a large contribution to GDP - more than 17% in 2006. For comparison, in the EU, the contribution of agriculture to total economic activity is 4,6% of GDP, while in the U.S. it is even lower 2%.

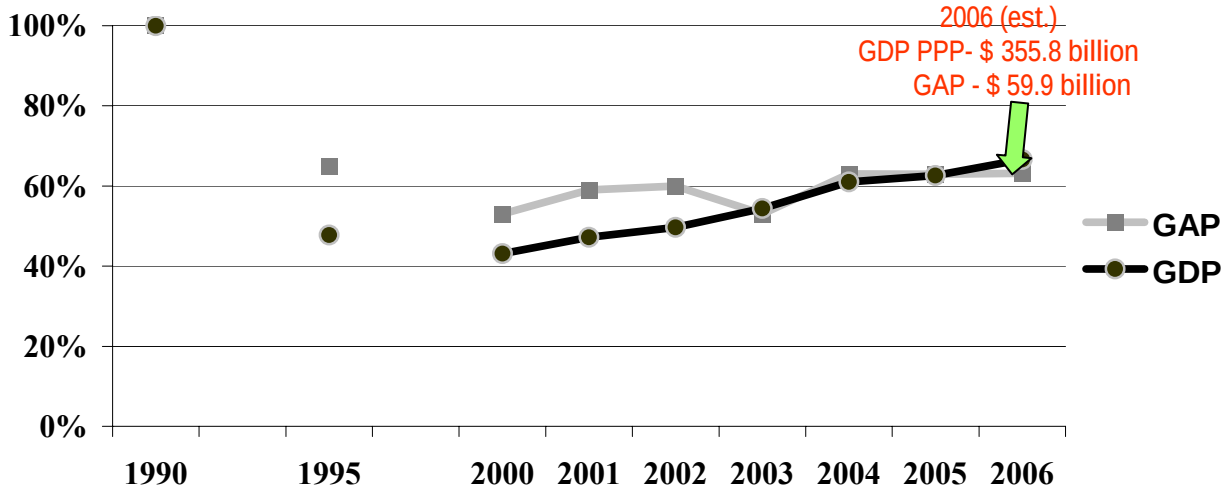
About 95% of food and 2/3 of consumer domestic goods are produced in Ukraine. Approximately 15 million people live in rural areas that makes up 1/3 of Ukrainian population.

The macroeconomic situation of the Ukrainian agriculture in the 90-th to present

Yet Ukraine is the biggest European agricultural country with reach natural resources, the efficacy of agriculture is much lower than in most of European countries and in the United States. F.e. potential yields for wheat in certain regions can reach as much as 7 tons/ha, but average yields are not higher than 4-5 tons/ha. These phenomena explained by different reasons: the main reason is the previous command-administrative economy with a state - and collective model of agriculture.

With the independence in 1991 Ukraine faced the transition period with reformation of the economic and agrarian sector. It leaded to a serious sharp recession of the agricultural production as well as of the GDP. Figure 1 shows the trends of changes of GDP and Gross Agricultural Product (GAP) pointed to a great decline.

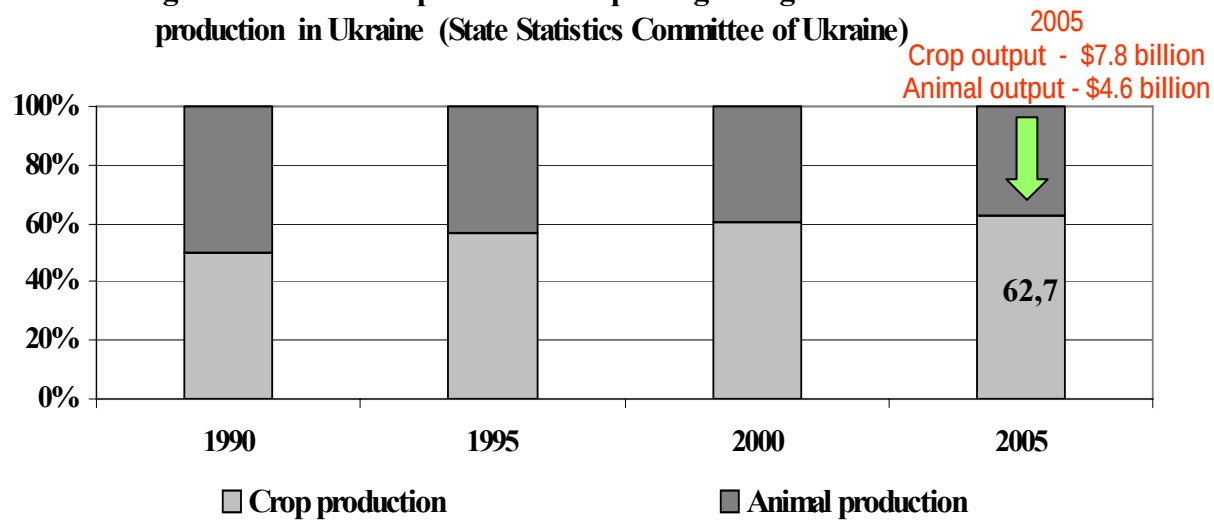
Fig.1 Dynamic of GDP and GAP in Ukraine (State Statistics Committee of Ukraine, 1991-2006), per cents



The most obvious economic recession occurred during the first 5 years of the 90th. Starting from 2000 Ukraine faces economic growth though it doesn't reach the level of 1990. For the last two years economic growth has been slowed down sharply but still is continuing.

Since the 90th the share of crop output within GAP has risen consistently. In 2005 the farm sector produced $7.8 billion (unadjusted for inflation) of crops and $4.6 billion of livestock products. The proportion of agricultural production was 63% of crop output to 37% of livestock production (fig.2).

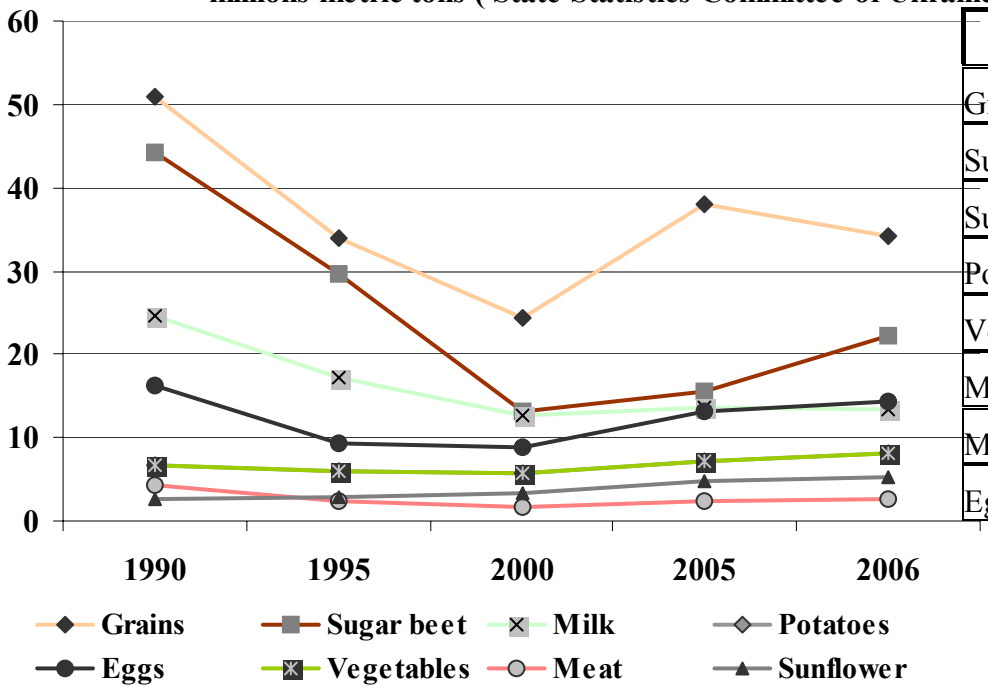
Fig. 2. The share of crop and animal output in gross agricultural production in Ukraine (State Statistics Committee of Ukraine)



Agricultural production has gone through a main crisis caused by reduction of demand and a shock of transformation to a new economic environment. For the last five years the output of main agricultural products was stabilised (fig. 3).

Being the biggest Europe's agricultural producer of grain (approximately 35-40 million metric tons), Ukraine is world's largest exporter of wheat and barley. Since 1990 the country increased production of sunflower seeds. However, the output of milk, meat and sugar beet continued to decrease up to 2000. At present major agricultural products demonstrate a slight increase (fig. 3).

Fig.3 Output of the main agricultural products in Ukraine, millions metric tons (State Statistics Committee of Ukraine)

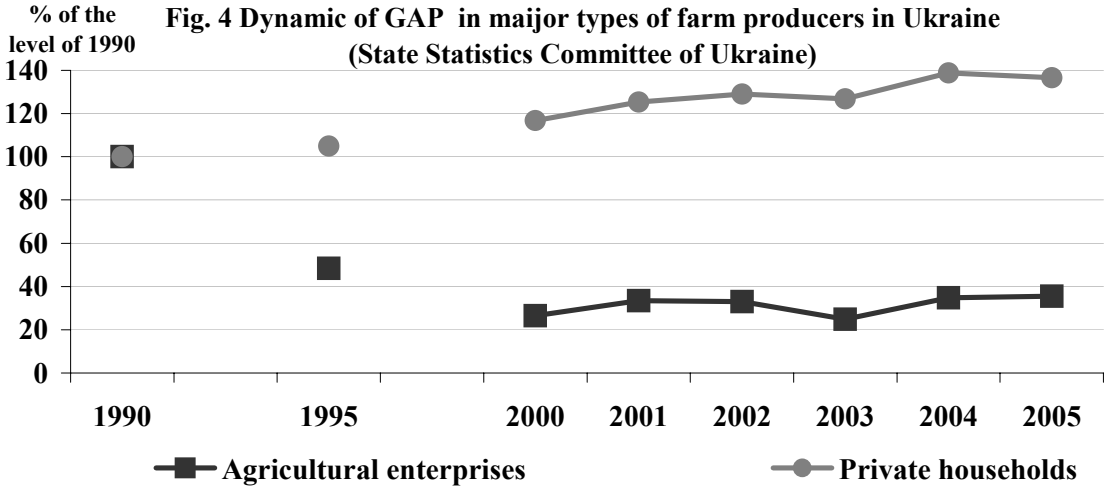


	1990	2006
Grains	51.0	34.2
Sugar beet	44.3	22.3
Sunflower	2.6	5.3
Potatoes	16.7	19.5
Vegetables	6.7	8.1
Meat	4.4	2.6
Milk	2.5	13.3
Eggs	16.3	14.2

The development of the last 10 years shows the considerable changes of Ukrainian agricultural structure in the farming system, and its output. Up to 1992, the main agricultural producers were kolkhozes and sovkhozes (collective and state farms). The insignificant role played individual households, which were operated by kolhoz and sovkhoz members on small land plots (up to 1 hectare).

Following the land reform the individual sector, presently recognized as private households, increased remarkably in terms of agricultural production, while agricultural output in reformed agricultural enterprises (previous collective farms), has significantly reduced. From the level of 1990 the share of GAP in large-scale agricultural enterprises was dropped almost 3 times. At the same time the level of GAP in private households increased by 40% in 2005 (fig. 4).

Fig. 4 Dynamic of GAP in maijor types of farm producers in Ukraine (State Statistics Committee of Ukraine)

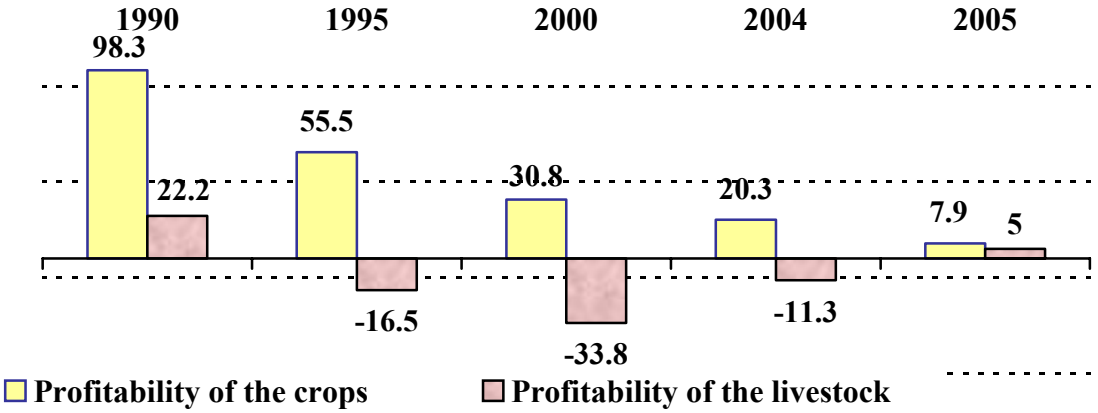


According to the statistics, in 2006 the private households provided more than 60% of GAP, including 55% of crops and 65.5% of livestock production. Together with private farms, which emerged in the 90th, this private sector produced 2/3 of total GAP. The GAP of agricultural enterprises has been growing since 2004, including in private farms (11.6% of GAP of agricultural enterprises in 2006).

At present, the agricultural enterprises are the main producers of grains (wheat, barley, corn) and industrial crops such as sugar beets, sunflowers. Small-sized private farms produced vegetables, potatoes and make almost two third of the animal production.

Meanwhile the share of livestock production was significantly decreased in both sectors. It is mostly explained by negative profitability in livestock that has led to cutting down the animal production more than twice from the level of 1990 (fig. 5).

Fig. 5 Profitability of crop and livestock output in Ukraine, per cents (State Statistics Committee of Ukraine)



While livestock production in Ukraine was not very profitable till 2004, the present situation with livestock is going to be improved. It is expected that Danish, Polish and Ukrainian investments in large-scale hog enterprises, with an average capacity of 40,000 hogs will lead to positive changes in livestock. (Attaché report: Ukraine Livestock and Products Annual, 2004). The total profitability level among the farms in 2005 was 14.6% (level of profitable enterprises was 65%).

So, since 1990 Ukrainian agriculture demonstrated both significant decline of GAP up to 50% during the first 10 years and a following recovery since 2000. In terms of production, the private farm sector has significantly increased its share of the agricultural output. These considerable changes are mainly caused by land reform and widespread farm reorganization.

Land reform and reorganization of the farm sector

Land reform in Ukraine started in 1990, and it was directed to agricultural land privatisation by transferring agricultural land from the state to the private ownership.

Officially it is considered three stages of land reform.

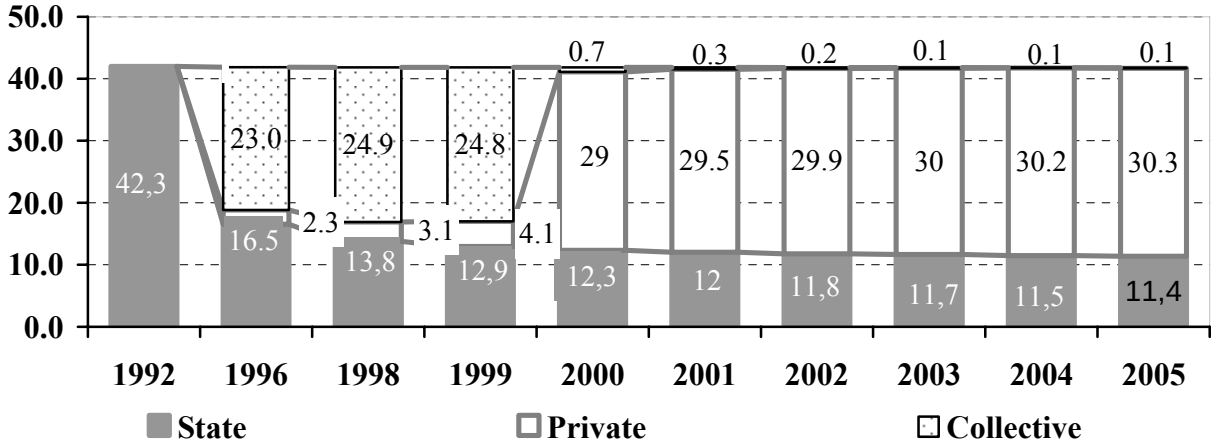
At the first stage during 1991-1994 all land of kolhozes and sovhosez (large-scale farms) was transformed into mostly collective, & private ownership. However, only a small portion of the land (5%) was given to new-emerged farmers (2,2 million hectares). It was preceded by the land inventory.

The second stage (1994-1999) was started with the distribution of collectively owned land into shared ownership. The rural residents, mainly the member of collective enterprises received entitlements for a share of possession the agricultural land without its allocation (but with specification of the size and value of the land share in conditional (cadaster) hectares). The land leasing development has been the other important result of this stage.

The final stage (1999- present) of land reform has been resulting in the reorganization of the farm sector and in granting the private ownership on specific agricultural land plots to rural citizens.

The redistribution of the land property during 1990-2005 was determined by the intensity of the land reform in accordance with its stages (fig. 6). At present, almost 73% of the agricultural land (30.3 million ha) is in private ownership. About 27 % of the agricultural land (11.4 million ha) remained in state ownership, which is used for scientific and training purposes.

Fig. 6 Dynamic of agricultural land distribution in Ukraine by ownership patterns (State Land Committee of Ukraine, 1991-2006), millions of ha



The significant changes were occurred in 2000, when Ukraine's agricultural sector was restructured. Almost 15.1 thousands of collective and state farms were transformed into new forms of agricultural enterprises, and new private corporate farms (4 thousands) emerged (Z. Lerman et. al., 2006).

Presently, the agricultural farm sector could be divided into three major groups:

- agricultural enterprises (including limited liability companies, cooperatives, private lease enterprises, private corporate farms; average operated land ranges from 1.3-1.8 thousands ha);
- private individual farms (operated farmland on average - 77 ha per farm);
- individual subsistence households (small household plots - up to 1 ha used for individual farming).

According to the data of the State Land Committee, in 2006 there were 20,6 thousands agricultural enterprises and 46.5 thousands private farms. The great variety of individual households (dozens of thousands) operates on small land plots (average size - 0.54 ha).

While private individual farms in total own 3,6 million hectares of agricultural land, the agricultural large-scale enterprises control more than half of the total agricultural land (22 million ha). The average size of large-scale enterprises is relatively larger than the average size of farms in the EU and the US.

Probably, the main result of the land reform in Ukraine is that nearly 7 million rural residents (15% of the Ukrainian population) became owners of agricultural land plots. It was also allowed for foreigners to lease agricultural land in Ukraine up to 50 years. However, the new landowners are prohibited from selling their own land because of a moratorium until 2008 that may be further extended. Agricultural land inherited by foreigners must be sold within one year after the inheritance.

More than half of the new owners are of retirement age or do not live in the countryside. The majority of them has neither sufficient resources to use land or knowledge to run an independent farm. As a result, more than 2/3 of the owners lease out about 18 million ha of agricultural land.

Consequently, the Ukrainian farm sector can be characterized in three ways: on the one hand there are small households under-equipped and commercially unviable; on the other hand large-scale commercial agricultural enterprises relatively better equipped that rely primarily on land lease; and finally private individual peasant farms that is similar to family farms in market economies.

Subsequently, there have been changes in agricultural land use, such as a 1,1 million hectares decrease in arable land, followed by increase in pastureland of 429 thousands hectares, 256 thousands hectares in grazing land and 419,3 fallow (table 1). The last category is mostly abandoned land.

Table 1: Area of land change in Ukraine (State Land Committee of Ukraine, 1991, 2000, 2005)

	1990	2000	2005	2000 - 2005	
				1000 ha /years	% change
	million hectares				
Agricultural land:	42.03	41.82	41.72	-308.1	-0.7
Arable land	33.57	33.29	32.45	-1118.9	-3.3
Grazing land	2.17	2.22	2.43	256.3	11.8
Pasture	5.09	5.30	5.52	429.7	8.4
Permanent	1.06	0.93	0.90	-157.5	-14.9
Fallow (abandoned land)	-	0.42	0,42	419,3	-
Non-agricultural land:	18.32	18.52	18.63	310.1	1.7
Forest land	10.36	10.41	10.50	282.1	2.8

A reduction of 1.1million ha in total arable land was registered, whilst the non-agricultural area increased by 310 thousands ha (more than half of which is forest land).

While the arable land has significantly increased its portion is still considerably significant, especially in the eastern and southern oblasts (more than 80 % of the agricultural land).

Environmental situation in the Ukrainian agriculture

A brief overview of the environmental situation in Ukrainian agriculture (agricultural land and soil, forests, water and biodiversity) and pressure on the environment are presented in table 2 and 3.

Table 2: Strengths and weaknesses of the agri-environment in Ukraine, 1990-2005

Strengths	Weaknesses
Agricultural land and soil	
The agricultural land is mostly flat, suitable for large-scale cultivation.	A significant portion of the land (40%) is exposed to water and wind erosion (13,2 & 6 million ha).
Continued decrease of the area of agricultural land, particularly of arable land	The portion of arable land remains relatively high (76% of agricultural land).
Continued decrease of sown area under crops.	More than 65% of sawn area is under industrial crops.
2/3 of arable land is considered to be very fertile	Decreased humus content from 3.2 to 3.1% last 10 years
Growing appreciation of no-till farming (at present-60000 ha). Organic farming comprises 0.96% of arable area	Abandoned of crop-rotation practices, increased row crops planting. Part of agricultural land is abandoned (1-2 %).
Withdrawn from agriculture in most radioactive contaminated areas after the Chernobyl accident. Establishment of Chernobyl exclusion zone	3,7 mln. ha remained under radioactive contamination , incl. 1 million ha with middle and high level from 1 to 5 KI/km^2 (Chernobyl: Ten Years On, 2002)
Forest	
Slight increase in the area of forest land up to 282000 ha. Presently, 10.1 million ha of forests (17.9% of the land). Well-established forest belt system on the ag. fields	Low portion of forests in comparison to the one in EU. In some regions its share doesn't exceed 4% of the land. The average length of forest belts had been dropped by 16%
Water	
Favorable trend to reduction of mineral compounds of nitrogen in most of the river basins	Majority of water is classified as polluted, dirty (IV-V quality class), some as very dirty (Dnipro, Siv.Donets)
Biodiversity	
Development of a National Ecological Network. The area of semi-natural grassland has slightly risen during the last 15 years.	Habitat loss associated with agricultural practices on over 30 million hectares of arable land. Protected agricultural areas: areas inside of protected areas comprise only 3%.

Table 3. Pressure on the environment in the Ukrainian agriculture, 1990-2005

Positive factors	Negative factors
Agriculture	
Decreased environmental impact of agricultural production related to significant drop of agricultural production (45%)	The significant extent of the negative impacts in certain areas, particularly erosion, depletion, irrigation issues
Fertilizer and pesticide consumption drops several times.	The high concentration of hazardous elements & compounds in the soil in industrial regions
The decreased irrigation in terms of water consumption. At present, irrigation is used mostly for vegetables and forage.	The increased area of salinated land (1.3million ha), incl. heavy salinated land (463 thousands ha).
The decreased drainage in agriculture since 90th. At present, drainage is used for permanent meadows, cereals, forage	The technical renovation of drainage meliorative system is required on the 510 thousands ha.
The decreased livestock between 1990 and 2004 (twice).	Large scale farming is intensively recovered.
Other economic sectors	
Continued reduction of negative impact into environment (atmospheric deposition, contamination by heavy metals etc)	Poor agri-environmental management, absence of agri-environmental programs and practical mechanisms

Soil erosion. Soil erosion is the most significant environment issue in Ukrainian agriculture which also decreases soil fertility. It is estimated that almost 40% of agricultural land is subject to erosion.

The land affected by water and wind erosion is 14.8 million ha, including moderately- and strongly eroded - 31.3%, or about 5 million ha. Some 4% of arable land is significantly eroded (1.2 million ha). The main area being affected by erosion occurs in the southern region (41.7% of agricultural land), eastern and central Steppe regions (33.1%). Researchers have estimated that on average 8-30 tons per hectare is lost yearly from tillage. The damage due to erosion is accounted $10 million annually (Bulygin, 2006). According to official data annual economic loss caused by erosion is more than 22 billion Hrivnas. It is necessary to note that the latest official data on soil inventory are available for 1996. The last overall large scale all-Ukrainian soil survey was conducted in 1957-1961, and further soil resurvey was hold until 1990.

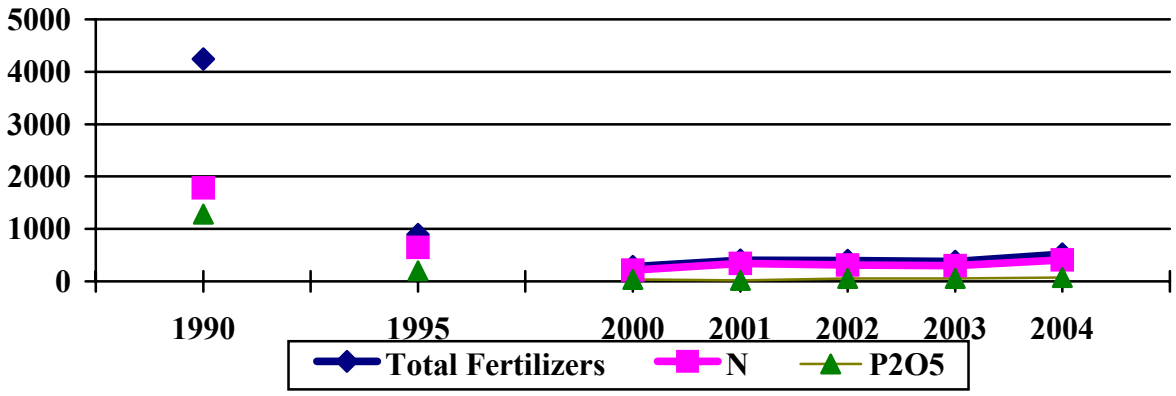
Another major concern is ***loss of soil fertility***. According to the State Soil Protection Technological Center "Tsentrderzhrodyuchist'" of the Ministry of Agrarian Policy of Ukraine the soil humus content decreased from 3.24% to 3.14% for the last 10 years. It occurs mostly because of insufficient mineral and organic fertilizer use and abandon of crop-rotation practices. For example, most of farm operators abandoned the traditional crop-rotation practices, such as 1-in-7 rotation, planting sunflowers no more than once every 7 years in the same field etc. Besides, increased planting of row crops (grain, sunflower) leave soil exposed for soil losses. As a proof, started from 1990 the grain crops have increased from 45 to 63%, sunflower cultivation has increased from 5% to 15 % of sown area. It also has significant off-site impacts due to increases in water runoff and losses of sediment.

Conservation tillage and organic farming. Conservation agriculture has been implemented in some regions in Ukraine since the 1970s. It was started from practicing the system of soil tillage without ploughing followed by application of organic harvest residues and physical and biological plant pest management. At present, the organic agriculture is mostly applied in Poltava, Cherson oblasts and western part of Ukraine, while no-tillage is widespread in Eastern part of Ukraine (Dnipropetrovsk oblast). Overall, lands with low agricultural inputs (that is under organic farming) comprised 0.96% of all arable area in Ukraine (V.Prydatko,2005). However, regulations for certification of organic products are not developed. For comparison certified organic and in-conversion area covered 5.7 million ha in EU-25 and represented 3.6 % of the utilized agricultural area in 2003. Program to support no-tillage and organic farming in Ukraine should therefore be implemented with adequate funding.

Fertilizer and pesticide consumption. Fertilizer consumption in Ukraine declines dramatically from 4.2 million tons of nutrients in 1990 (when admittedly fertilizer was excessively and wastefully

applied) to 518 thousand tons in 2004. Particularly, application rates for wheat were down to 26 kg in 2003 from 149 kg in 1990. However, the trend of inorganic fertilizer application is started to increase over recent years as a response to new market opportunities (fig. 7).

Fig.7 Trends in the use of pesticides and fertilizers in Ukraine (State Statistics Committee of Ukraine, 1991-2006), thousands tons



Of 170 pesticides used in Ukraine, 49 are particularly harmful as highly toxic, supercumulative and stable (L. Hryniv, 1999). More than 20 % of the investigated agricultural lands are polluted by DDT, about 4 % are polluted by hexachlorine-cyclohexane (EPA report, 2003).

Pesticides consumption in agriculture pollutes surface water, ground water, and soils as well. Of the total amount of nitrogen and phosphorus applied to agricultural land, about 20% of nitrogen and 5% of phosphorus reach the water bodies with surface runoff.

The use of organic fertilizers have decreased 3 times due to the cut of the livestock (almost 2 times). At present, organic fertilizers are used in small quantities. New fertilizer practices, such as integrated crop management should be evolved in farming sector.

Irrigated and drained area. In the southern part of Ukraine (Kherson, Zaporozhya regions, the Crimean Republic etc.) irrigation is essential for agriculture and results in high water demand, while in northern part of the country (Volyn, Zhitomir, Chernigov regions) drainage is widespread for forage purposes. Both processes affect several millions hectares of land. For example, conversion of 1.4 million ha into agricultural land through extensive drainage in Polessye Region (northern part) in 1960th leaded to a damage of the rich wetland ecosystem and lost of its biodiversity.

Nowadays, the registered area of irrigated and drained farmland accounts 2.2 and 2.3 million ha, respectively (State Land Committee of Ukraine, 2006).

Although large-scale land irrigation/drainage systems in Ukraine were launched in 50-70th of the last century, the present irrigation and drained systems have become out of date. They are largely in poor technical condition and require upgrade and capital repair (the drainage and irrigation equipment required renovation on 20% of irrigated land and 10% of drained land).

Existing irrigation and drainage continue to exert a negative impact on the environment. As a consequence irrigated regions of southern and eastern region of Ukraine are characterized by salinisation and the destruction of irrigated lands, as well as lost of wetlands and aquifers.

Radioactive contamination. Radioactive contamination after Chernobyl disaster in May 1986 is considered to be a serious environmental problem in the northern and north-eastern part of the Ukraine, with extensive areas of agricultural land contaminated by 137Cs. Approximately 1.1 million ha of agricultural land contaminated by 137Cs (>1 Ci/km^2). For preventing its exposure on the human being it was set the exclusion zone (4000 km^2), and restrictive measures on agricultural activity were provided, including exclusion from farming on 35600 ha of contaminated land (Chernobyl: Ten Years On, 2002).

Over 20 years after the Chernobyl accident the exposures on human in agriculture are mainly due to food consumption in radioactive polluted areas. However, it is difficult to establish over polluted

areas, since radioactive contamination was diffused all over the territory. The restrictions on the use of agricultural land are still necessary in contaminated regions.

Water pollution and other environmental issues. Agriculture is the major source of water pollution in the Ukraine. Agriculture consumes annually over 10.9 billion cubic meters of water (36.4% of total water consumption). From 1990 to 2000 the wastewater discharge from agriculture has decreased. However, the existing monitoring cannot determine the quantity of pollutants coming from diffuse agricultural pollution. Started from 2000 the registered wastewater discharge has slightly increased.

Together with water issues agriculture provides substantial pressures on the forest, biodiversity, air and other environment in the most intensively farmed areas.

Two major reasons of agri-environmental issues in Ukraine are:

- inappropriate farming, and
- absence of systematic agri-environmental measures.

Inappropriate farming in Ukraine comes from the previous Soviet times while large-scale intensive ploughing was used on arable land. The previous policy was directed towards the increase of agricultural production by means of agricultural land extension. As a result, farming was developed in unsuitable areas, and on marginal and ecologically sensitive land, such as wetland, forests, dry land etc.

During the land reform these lands together with severely degraded agricultural land were not excluded from its privatization. From 5 to 8 millions hectares of degraded and low productive agricultural lands are still in use without any economic sense, leading to further soil degradation, loss of biodiversity and water purification.

Inappropriate farming also connected to mismanagement, the lack of knowledge for better farming practices, shortage of technical agri-environmental equipment (f.e. farm equipment for no-till) etc.

Finally, agri-environment measures were stopped due to a lack of financial resources and the absence of new updated mechanisms for the conservation on privately owned lands. Several institutions for land management and conservation (land survey, protection etc.) have fallen into decay. Furthermore, there is no extension service able to provide comprehensive information and technical assistance to farmers.

Policy response

The development of Ukrainian agri-environmental policy is at a relatively early stage. Environmental policy is set out at the national level at the form of environmental strategy -"*Principal Directions of State Policy of Ukraine in Environmental Protection, Use of natural Resources, and Ensuring Environmental Safety*" (1998). This law has incorporated conservation provisions for some of the environmental programs, including the current environmental programs:

- National Program for Environmental Rehabilitation and Drinking Water Quality Improvement in the Dnipro Basin (1997);
- The 2000-2005 National Program for the Eco-Corridor Network Development (1999);
- National Program for Environmental Rehabilitation of the Black Sea & the Azov Sea (2001) etc.

The agricultural issues in this law are divided into separate sections. However, specific agri-environmental programs were not introduced.

Since the recent environmental policy strategy was adapted by the Ukrainian Parliament in 1998, the main attention is now turning towards the development of a Sustainable Development Strategy, which again will include the environmental concern in agriculture that included agri-environmental measures.

On the institutional level the State Land Committee of Ukraine (recently transformed to State Agency of Land Resources of Ukraine) and Ministry of Agricultural Policy of Ukraine have

responsibility for developing land conservation and agri-environment policy. New environment institutions, including Soil Conservation Service are in the process of the development.

On the legislative level the *Law on land protection* (2003) and the *Law on state control of use and protection of land* (2003) include provisions to restrict improper use of land. However, there is no well-organized service for ensuring its applications (Environmental Performance reviews: Ukraine, 2006).

A draft of the *State Program for the Land Use and Protection in 2006–2015* was developed by the State Land Committee of Ukraine in 2004. It includes soil protection measures and government assisting in farming at the farm, village and rayon levels. However the resources to implement this program are subject to budget constraint. Better farming practices, including no-tillage and reduced tillage, need to be encouraged in order to protect agricultural land. For that reason, voluntary enrollment mechanisms and participation incentives of private landowners and operators' involvement should be further developed to implement this program. Together with technical support and cost-sharing assistance this program would be valuable policy tool of land resource enhancement in Ukraine.

Few agri-environmental initiatives have been established in other institutions. For example, in 2003, the Ukrainian Academy of Agricultural Sciences released a *Conception of Sustainable Agro-landscapes*. Nevertheless, practical application and mechanisms are required for its implementation.

Recently the National Association of Agricultural Advisory Services was established, with a network of 25 centers in 24 oblasts and the Republic of Crimea. Though, their activities don't include the agri-environmental concern. Training programmers and extension services are needed in the development of land conservation programs.

In line with environmental policy concern Ukraine agriculture is a significant source of environmental pollution throughout Ukraine. When comparing the size of the sector with the applicable environmental regulations in other economic sectors, the scope of the legislation appears very poor.

To sum it up, it is important to strengthen agri-environmental policy in Ukraine through providing realistic and practical agri-environmental programs and measures. There is a large potential to improve both agriculture and its environment that will result in economic efficiency and profitability. It is required to integrate the environment into the agricultural sector.

Ukraine also needs to strengthen the agricultural advisory services, particularly in the provision of agri-environmental assistance and training materials, and develop mechanisms for cost-sharing and incentives mechanisms to induce farmers provide agri-environmental measures and practices.

Conclusions

(1) Ukrainian agriculture ranges from large-scale, highly intensive agricultural production to very small households' farming operating mainly on tiny land plots.

(2) The land reform and farm reorganization leads to further diversity in terms of land ownership, agricultural production and farm development.

(3) The transformed agricultural sector resulted in:

- intensification of crops cultivation and gradual livestock recovery,
- parzelisation of arable land, its partial transformation in fallow.

(4) So, with land use transformation agri-environmental issues began to change in different ways that vary in scale and intensity.

(5) The decline of agricultural production during transition period consequently resulted in diminishing of nature resource use that scaled back many environmental pressures. Nevertheless, the level of present negative environment impacts remains considerable.

(6) At present, intensive farming, lack of financial & technical resources as well as absence of practical agri-environmental measures result in land degradation and create new environmental challenges.

(7) Finally, with market development the pressure on environment in agriculture will be increased.

(8) Therefore, for Ukraine it is necessary to:

- develop and implement new agri-environmental policies on the private agricultural lands and strengthen their cost-effectiveness (through development of realistic and vital agri-environmental programs for farmers to reduce pressures on the environment);
- better integrate agri-environmental concerns in agriculture and sectoral decisions.

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