Overview on the pesticides problems within the context of persistent organic pollutants (POPs) in the Republic of Uzbekistan

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Introduction

Today, Uzbekistan is a large industrial and agrarian republic in Central Asia with intensive efforts to build up a new economy based on the market relations. The Republic of Uzbekistan has now the following main tasks to address in the field of ecology:

- Problems of nature protection in areas of large territorial - industrial complexes.
- Pollution of natural waters by industrial drains, pesticides and mineral fertilisers.
- Ecological problems in an agrarian complex.
- Problems in the Aral Sea and Aral region.
- Problems of protection and reproduction of both the plant and animal world.

The state of nature use and environment protection in the Republic of Uzbekistan is regulated by a package of the laws and law acts, which have been accepted during the last years. Among these main laws are:

- Law about the soil (1991);
- Law about the nature protection (1992);
- Law about the water and water use (1993);
- Law about the interiors (1993);
- Law about the atmospheric air protection (1997);
- Laws about the protection and use of the plant and animal world (1998);
- Law about the ecological expertise (2000);
- Law about the radioactive safety (2000);
- Law about the agricultural plant protection (2000);
- Decision of Olii Majlis of the Republic of Uzbekistan (parliament) about ratification of the international conventions and the other international standards.

In the Republic of Uzbekistan, the National Action Plan on environment protection for 2000-2005 years is accepted and directed on preservation and careful use of natural resources, creation of favourable conditions for population and human health.

The State Committee for Nature Protection of the Republic of Uzbekistan is an organisation, which is carrying out the state control and management in the field of nature protection and rational use of natural resources between the different ministries.

Reduction and liquidation of influence of the persistent organic pollutants (POPs) on the environment is one of the urgent issues of the National Action Plan on the environmental protection of the Republic of Uzbekistan.

The basic tasks, which should be executed in relation to POPs, include:

1. Realisation of an inventory and prioritarisation of pollution sources of POPs in agrarian and industrial complexes;
2. Organisation of the monitoring system for POPs pollution;
3. Regulation of production, import, export and rational use of chemical substances;
4. Destruction/utilisation of industrial wastes and obsolete pesticides.

The realisation of the National Action Plan on environmental protection for 2000 - 2005 requires co-ordination of this activity with the international conventions including:

- Basel Convention on the control for transboundary dangerous wastes;
- Convention on transboundary air pollution for the long distances;
- Rotterdam Convention on the preliminary co-ordination about trade in chemical substances and others.

Estimation of environmental pollution by pesticides in the Republic of Uzbekistan

The national action plan on the reduction/destruction of POPs is developed on the basis of the data analysis of previous years on air, surface, groundwater and soil pollution by POPs in Uzbekistan.

Pesticides pollution of water resources

Next to the industrial activities in Uzbekistan, the agricultural irrigation is one of the largest areas of activity. Therefore the pollution of surface waters is caused mainly by the industrial and agricultural activities.

The reduction of the amounts of pesticides and mineral fertilisers applied in the agriculture has led to a positive influence on the quality of the surface waters. In the last years (1991-1996), contents of the HCH isomers in surface waters, has been decreasing (Figure 1) and did not exceed the maximum permissible concentration (MPC). Except for the Aral region, where the concentration of these pesticides is kept at the level of 5 folds higher than MPC. The presence of DDT in water for this period was not indicated.

At the same time, the deterioration of the quality of shallow groundwater aquifers was observed. In particular, in the valley of the river Zaravshan, the content of DDE in the groundwater aquifer reached 4 folds the MPC.

The quality of the groundwater aquifers in the industrial zones of the Fergana valley causes a special alarm, as the contents of petroleum and phenols have exceeded MPC by more than 100 fold. The essential contribution of water pollution in Uzbekistan is caused by the enterprises of black and colour metallurgy, power, chemical and petrochemical industries. The consequences of their activity explain the presence of heavy metals, fluorides, phenols, chlorine, petroleum and other specific harmful substances in the surface waters.

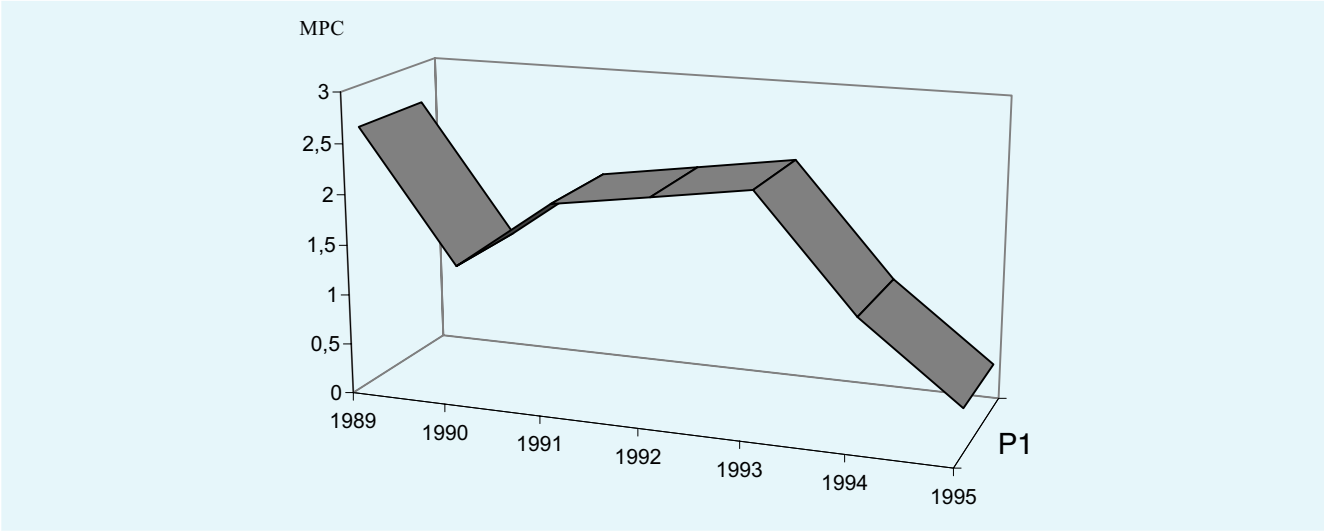

Figure 1. Dynamics of the contents of HCH in water (pool of the river Sirdarja)

Pesticides pollution of soil resources

Each year rational use of soil resources in Uzbekistan becomes more and more urgent and carries a global character. Agricultural lands occupy 28 million hectares (62% of all territory) of which 23 million hectares represent pastures, 0.7 million hectares are mountain areas and only 4.3 million hectares or 15% represent irrigation lands. Of these 15%, more than 95% of all total agricultural production of Uzbekistan takes place. The water resources of the irrigation areas are practically exhausted.

For the last decade, the structure of the sowing areas has changed: The cotton crop was significantly reduced (up to 45.2%) while grain and vegetable crops were increased (up to 44.6%) and only 10.2% was allocated to fodder and other cultures. This has, on the contrary, an effect on the fertility of the soils.

The main strategy in the field of agriculture in Uzbekistan is based on the introduction of the integrated systems of plant protection from the wreckers and illnesses. This is accompanied by the use of different pesticides: insecticides, fungicides, herbicides, defoliants and others.

As a positive fact should be noted, that for the last years the use of pesticides in Uzbekistan steadily decreases. During 1996, the consumption was reduced 4 folds compared with 1990 and amounted to 20.2 thousand tonnes (Figure 2 and 3). It can be explained, first of all by the progress of Western firms in the field of the manufacture of highly effective chemical products of plant protection of a new generation. These products have high biological

efficiency at small dozes of application and concern to unstable connections in environment. The various kinds of peritroides, sulphonilmochevins and other pesticides, which are popular in practice of agriculture plant protection, are also a worth replacement/alternative to POPs. Now on the list of pesticides, about 200 names of preparations are registered and permitted for application in Uzbekistan agriculture. Annually, the purchase and use are authorised for more than 40 preparations, including about 15 that are produced in Uzbekistan.

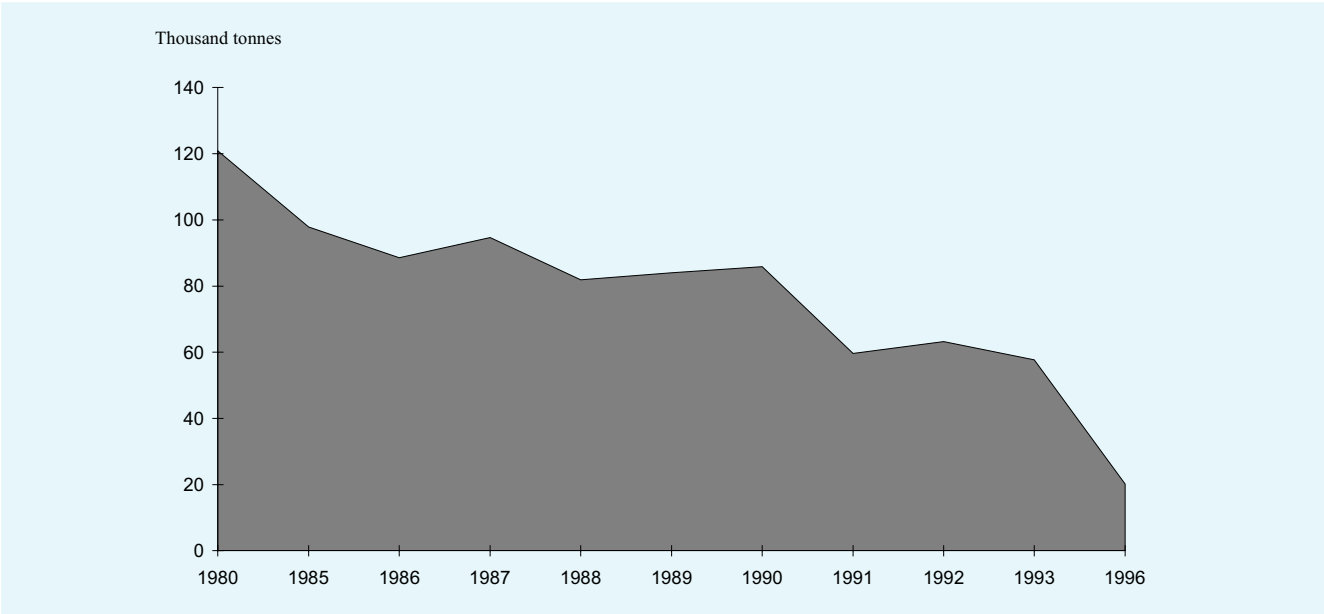

Figure 2. Dynamics of sales of pesticides in Uzbekistan

Figure 3 shows the relation of the combined sales of pesticides and mineral fertilisers. The sales of mineral fertilisers have also decreased, and after a peak of 1.4 million tonnes in 1993 went down to 880,000 tonnes in 1996. The bottom part of the graph indicates the sales of pesticides and the top part the sales of mineral fertilisers.

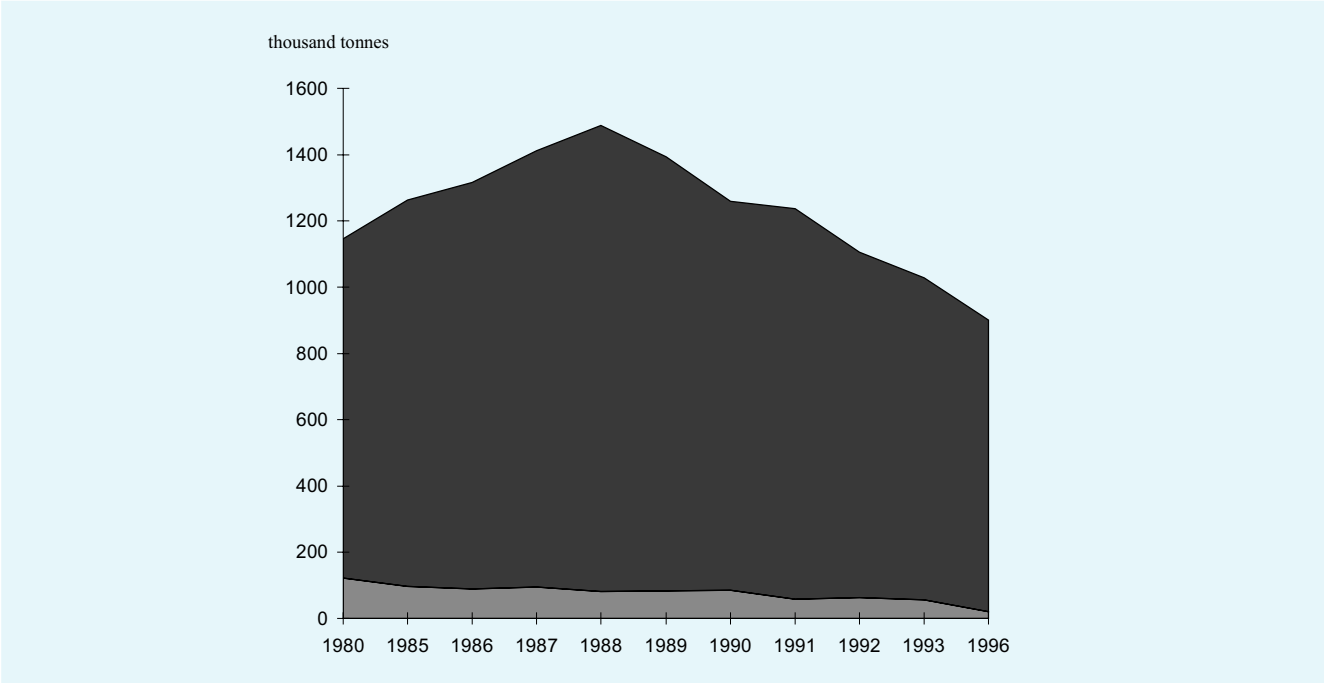

Figure 3. Dynamics of use of pesticides and mineral fertilises

The main strategy of Uzbekistan in the field of the agriculture is aimed at the use of complex pesticides that, besides their economic benefit, allow lower pesticide loads per hectare and also reduce the number of applications. Large attention is given to revival and introduction of biological methods of plant protection as ecologically safe and perspective.

The last heritage of basic soil pollutants, which still remains, is the group of chloro-organic pesticides, DDT and its metabolites. An average level of soil pollution in the Republic for the period 1990-1996 has reached 1.78-3.08 fold the MPC (Figure 4) and has a more significant variation among areas of Uzbekistan (Figure 5). During the last years, the level of soil pollution due to DDT and its metabolites remained high in the Fergana, Andijan and Khorezm areas. In spite of the fact that this preparation was banned since 1983, its residual quantities in the soil are not significantly reduced.

The soil pollution by other pesticides, including, isomers of HCH, treflan, thiodan, flyomethuron, metafos, phosalon, is insignificant and also the excess of MPC for the last years was extremely rarely observed.

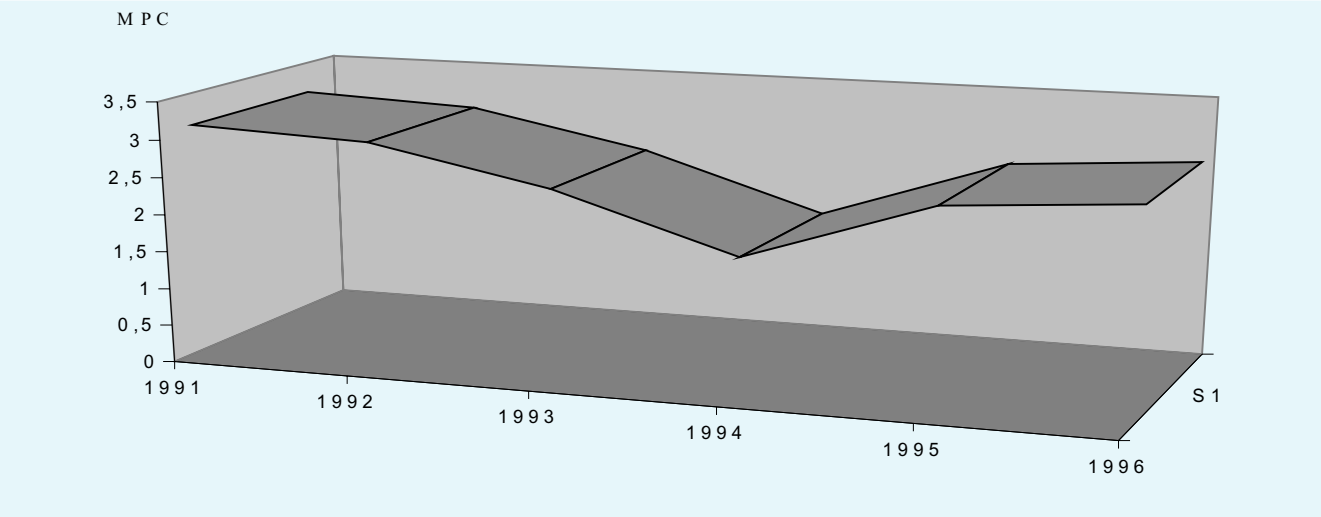

Figure 4. Dynamics of soil pollution of DDT (sum) in Uzbekistan

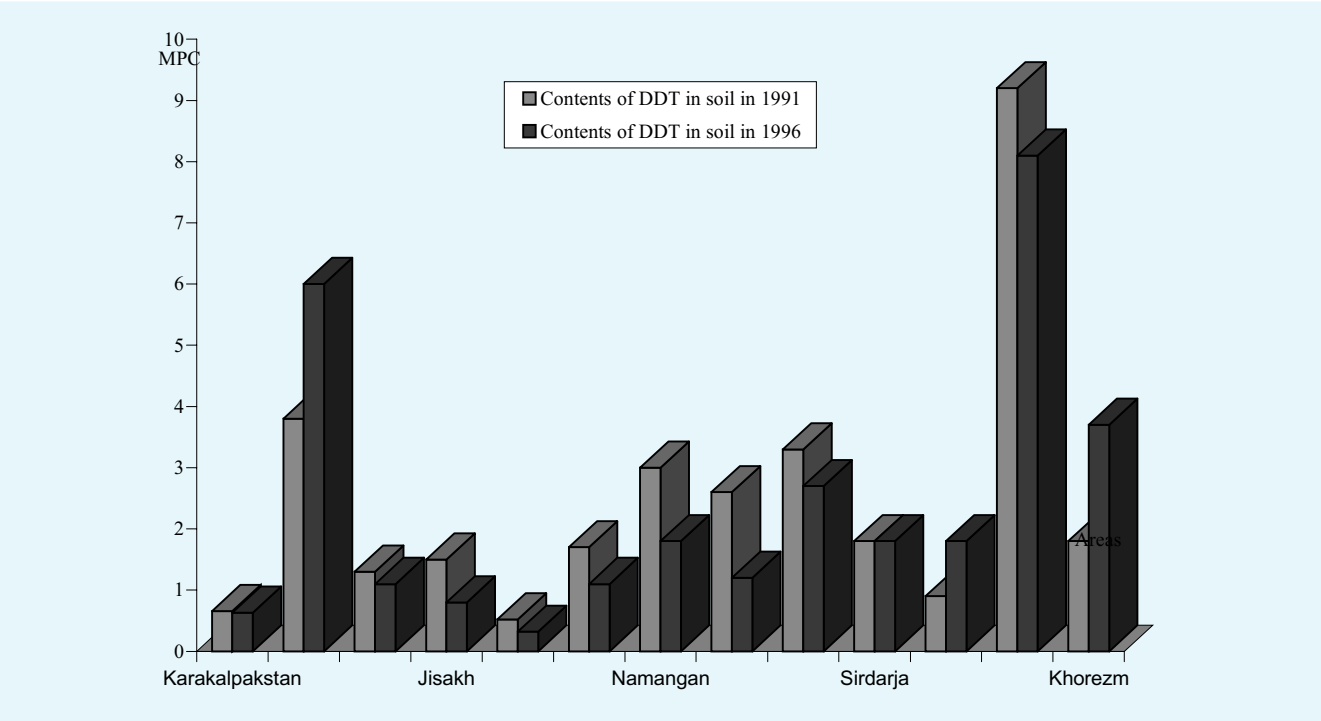

Figure 5. Dynamics of soil pollution by sum DDT (1991 and 1996) on areas of Uzbekistan

Inspections have shown that the territories of the former agricultural airfield stations were the most polluted by persistent organic pesticides. The level of soil pollution by DDT and its metabolites varies from several units up to ten thousands fold MPC. These high concentrations allow us to consider them as point sources of environmental pesticides pollution. The airfield stations are basically located in regions with intensive use of pesticides in the former years. These regions are Syrdarya, Surkhandarya, Khorezm areas and the Republic Karakalpakstan.

Obsolete pesticides

The State Committee for Nature Protection of the Republic of Uzbekistan has only tentative information about the presence of obsolete chemicals in the warehouses, which should be subject to final destruction. In Uzbekistan, the total quantity of pesticides of various preparations (including POPs), subject to destruction amounts to 10-12 thousand tonnes. This quantity is based on various information sources and it does not reflect the reality. It is necessary to note the extremely non-uniform accumulation of obsolete pesticides in the areas of the country. This can be explained by the inappropriate practice of utilisation and handling of these pesticides in the previous years (Figure 6). Therefore, the realisation of the complete inventory and the definition of possible solutions for application in Uzbekistan by means of processing, destruction or temporary containment of obsolete pesticides are getting more urgent now.

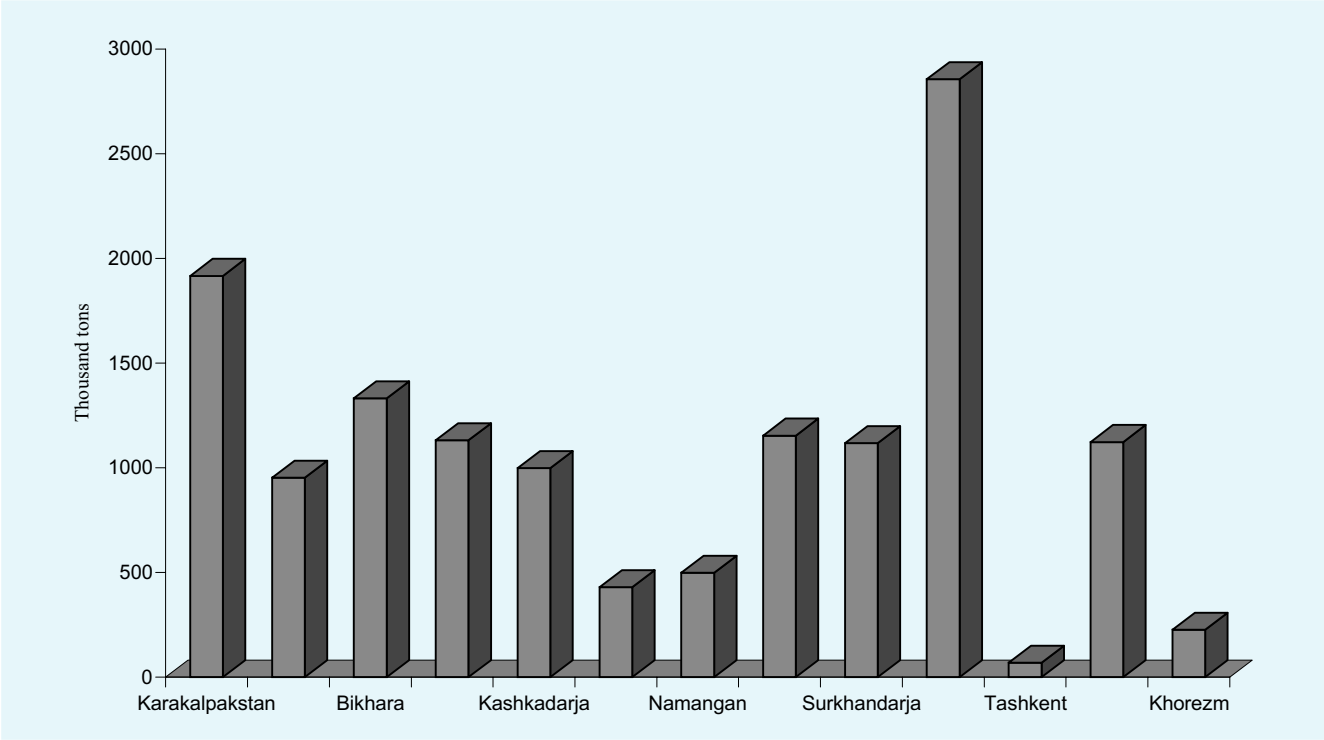

Figure 6. Obsolete pesticides in Uzbekistan (information data, total - 12-13 thousand tonnes)

Conclusion

At present, environmental monitoring in Uzbekistan is carried out for many parameters and directions that will really allow us to indicate the situation, so that the priority tasks can be defined. An important task for the successful realisation of the National Action Plan on the environmental protection for 2000 - 2005 is the active participation in the acceptance and performance of the international conventions. These conventions are directed to the preservation and careful use of natural resources and the creation of favourable conditions for human health. For the importance of pesticides issue, it is clear that two major issues have to be addressed:

1. Proper inventory of the locations of obsolete stocks.
2. Temporary measures for the elimination of direct dangers to human health and the environment.
3. Search for a plan of action and options of how to collect, safely store and finally destruct obsolete pesticides waste.
4. Plan of action in order to find international financial support.

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