



# Exogenic and anthropogenic processes

Deforestation,  
desertification  
and soil degradation



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# ➤ Environmental problems of Kazakhstan



➤ Environmental problem is one of the global issues in the contemporary international relations. According to expert conclusions, environmental situation in several regions of the Republic of Kazakhstan nowadays is not only unfavorable, but even catastrophic





- A considerable quantity of the power stations and heating plants of different capacities that use oil products, natural gas, and nuclear fuel, occupy large areas and they heavily pollute the atmosphere and soil with gases and dust affecting flora and fauna disastrously.



- As a result of mineral deposits development with infringement of scientific and technical rules, there is a loss of raw materials in the course of extraction, enrichment and transportation



- The ferrous and non-ferrous metallurgy enterprises use considerable quantity of water in their technological process (Ust-Kamenogorsk Titan-Magnesium, Balkhash Copper-Smelting enterprises, etc.). Thus the sewage containing considerable quantities of various oils, alcohols and phenols get to the rivers and water basins, and considerable quantities of sulfurous gases and dust get to the atmosphere.





- However, the greatest ecological damage is caused by the emissions of gaseous substances that pollute atmosphere. The level of air pollution in the fifteen cities of the Kazakhstan is raised by harmful emissions. The list of cities include **Zyrjanovsk, Aktau, Temirtau, Taraz, Petropavlovsk, Shymkent, Almaty, Ust Kamenogorsk, Pavlodar**



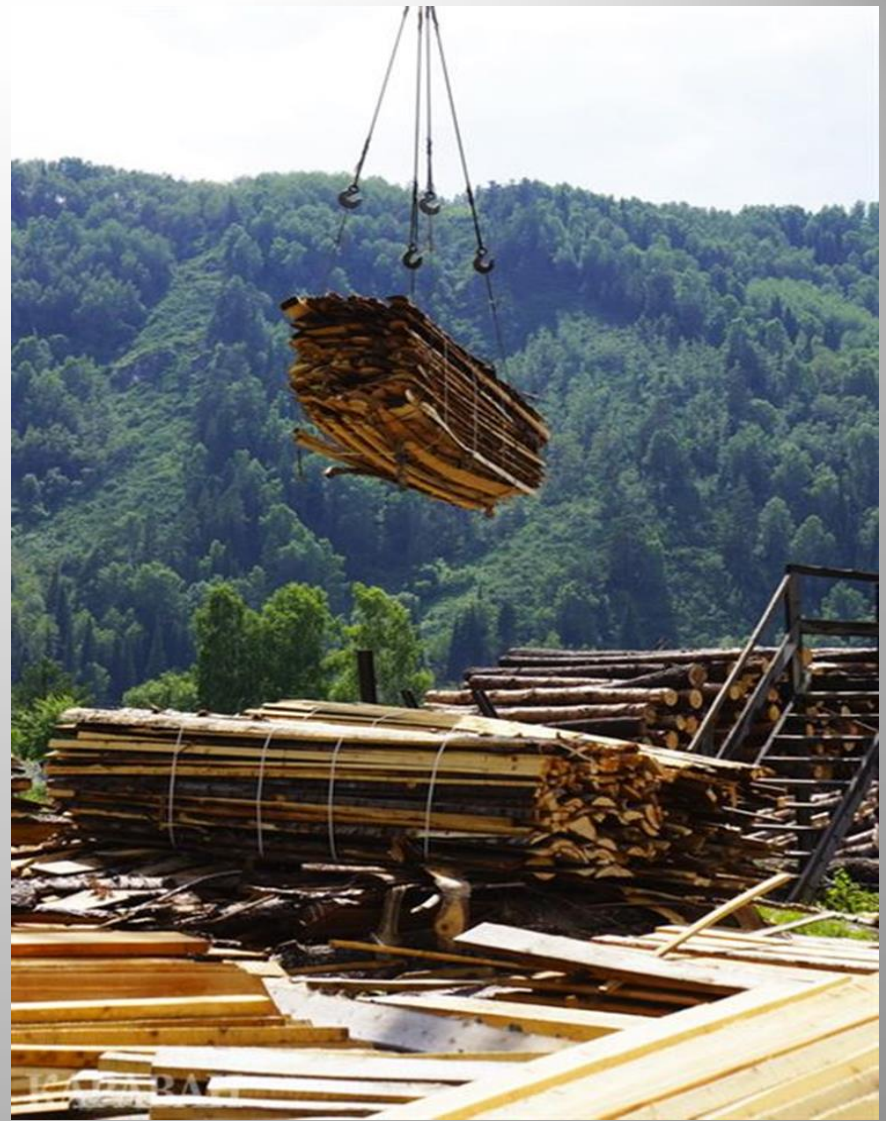
- The high concentration of the carbon dioxide is observed in such cities as Almaty, Aktobe, Karaganda, Kostanaj, Petropavlovsk, Pavlodar, Semei and some other.





- Because of the disorder of human economic activities, **the soil** cover is exposed to considerable negative influence, such as wind and water erosion, soil pollution with household and industrial wastes

Change of the vegetative cover occurs due to not only the natural phenomena, such as fires, hurricanes, etc., but also due to deforestation and bush cutting, mechanical destruction of vegetation during construction, irrigational-meliorative and a road works.



East Kazakhstan



Degradation of pasture lands in Kazakhstan has reached considerable sizes due to cattle pasture, soil erosion; desertification processes became more active





- Vegetation reduction in city landscapes leads to raise a temperature and air pollution in cities





The regions with a **more dangerous level** of ecosystems and geosystems destabilization in Kazakhstan **are water areas of Aral sea;** territory of Semipalatinsk nuclear testing polygon; northeast coast of Caspian sea, urban-industrial areas of Rudny Altai.



- Balkhash, Zhambyl, Zhezkazgan, Kyzyl-Orda, Temirtau, Shymkent, Almaty and Karaganda, the rivers Irtysh, Syr-Darya, Nura, Arys are regions with **critical level** of environmental destabilization.





- Aktau, Aktyubinsk, Atyrau, Semipalatinsk, Kapchagai water basins, Balkhash lake, Ili and Shu rivers are regions with **intense level** of the environmental destabilization.



- Regions with **satisfactory level** of the environmental destruction are urban-industrial areas of Kokshetau, Taldy-Korgan, Petropavlovsk, Uralsk and watershed of Ishim, Talas, Tobol, Sarysu, Ural rivers.
- Regions with **favorable level** of environmental conditions cover considerable, sparsely populated territories of Kazakhstan: semi-deserts, deserts, mountain areas (Chigarkin A.V., 1995).

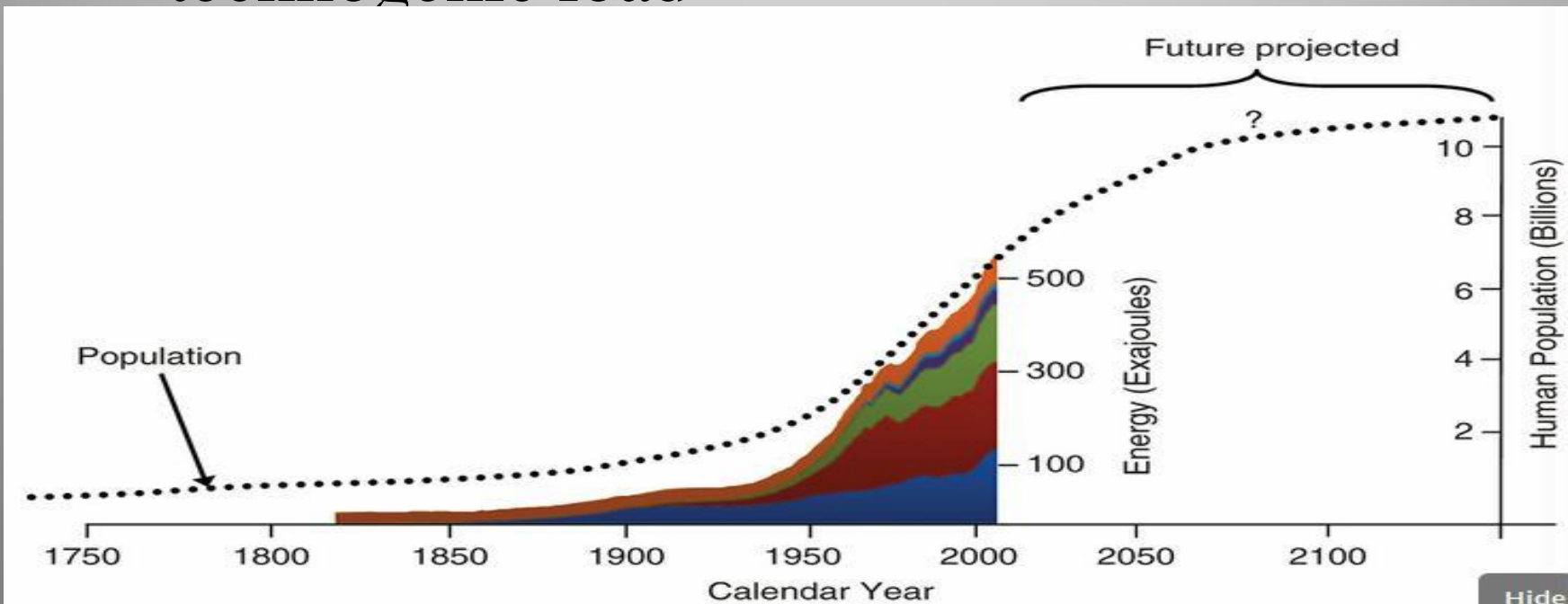
# Desertification

- Desertification is a serious threat for human welfare. It was estimated that from 50 to 70 thousand kilometers of fertile lands annually become unsuitable for use and the main reason for this is catastrophic phenomena is desertification.





- Desertification can become basic threat for successful social-economic development in many countries in XXI century under conditions of growing population of the earth, nearly complete reclamation of productive agricultural lands, and dramatic increase of technogenic load



At present 14 million hectare out 182 million hectare of ranchland in Kazakhstan are completely out of use. The total area of degradation is more than 50 million hectare

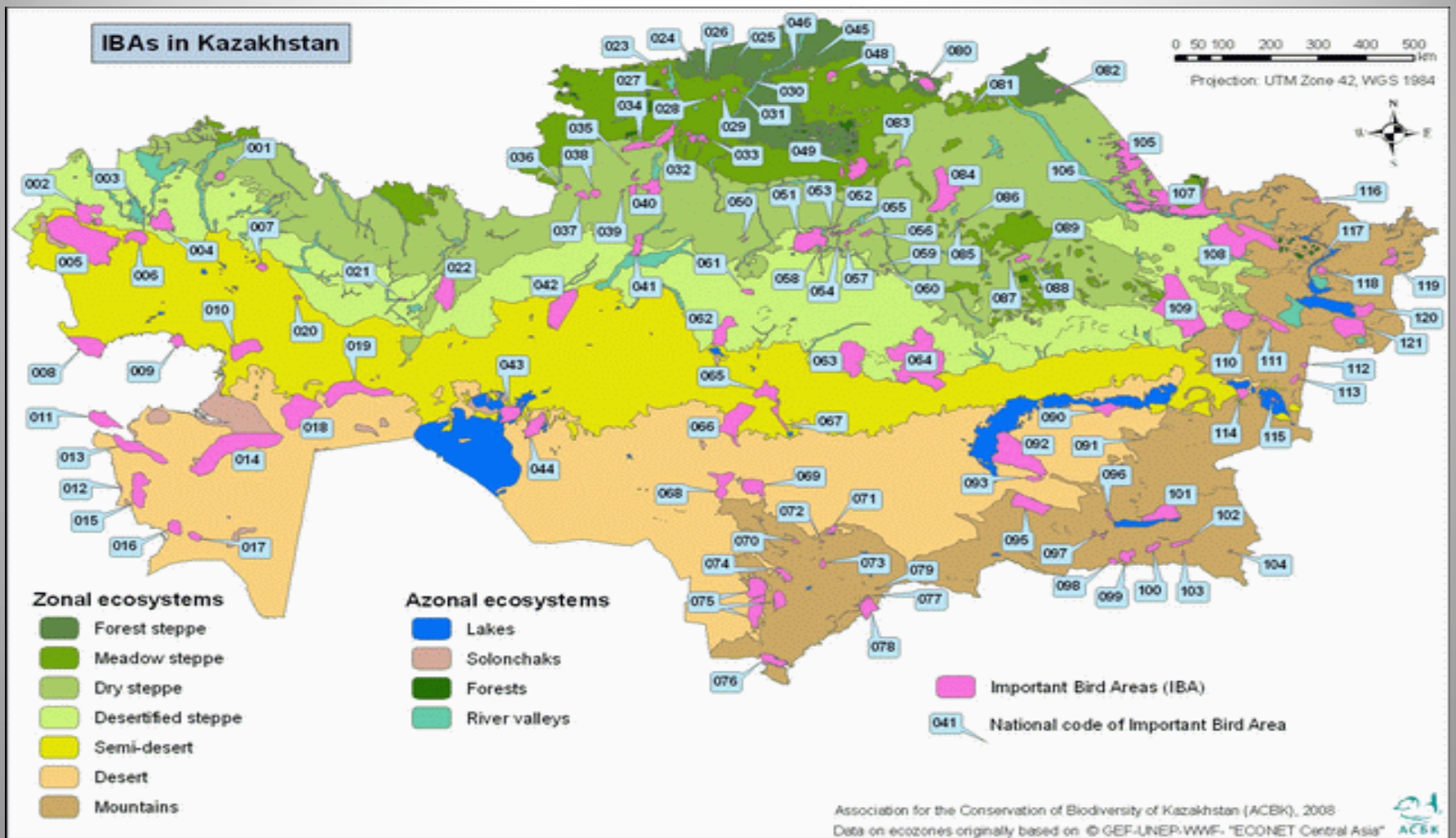




The reasons of desertification in Kazakhstan are both natural and anthropogenic factors.







- Anthropogenic factors that cause desertification processes in Kazakhstan are mainly connected with such types of economic activities as ranging, farming, building and operating of industrial, military, and civil facilities, irrigation and linear constructions. .





- Desertification is also caused by illegal wood harvesting, uprooting of shrubs and semishrubs for feeding cattle and as a fuel, by forest and steppe fires random recreationsm, dumps around human settlements, pollution of soils and underground waters with toxic substances, transport affect



Basic types of desertification in Kazakhstan determined in accordance with criteria adopted in Desertification Convention are

- plant degradation;
- water and wind erosion of soils;
- soil salination and dehumification;
- chemical pollution of soil;
- technogenic disturbances of lands.

# *Technogenic desertification*



- Development of industrial production in Kazakhstan and exploitation of mineral deposits went along with building of transport and engineering infrastructure, intensive extraction and pollution of water and land resources, direct and indirect negative influence on ecosystems.

# *Wind and water erosion of soils*

- Desertification caused by wind and water erosion of soils in Kazakhstan covered steppe, semidesert and desert landscapes. Fine soil particles are blown out and soils become sandy under the influence of wind erosion.





# Dehumification and salinification of soils

- The process of dehumification has been identified on all plough lands and ranchlands.



## *Vegetative cover degradation*

Vegetative cover degradation is one of the most spread and visually identified desertification processes in the form of forests, plough lands, and hay-fields degradation.



# Water, air and soil pollution



- The risks of chemical pollution of soils intensified dramatically in some last years. These risks are caused by specific substances from chemical cultivation of agricultural fields, disposal of industrial wastes, disposal of waste waters, atmospheric emissions in cities and industrial centers. Livestock wastes also cause soil pollution.





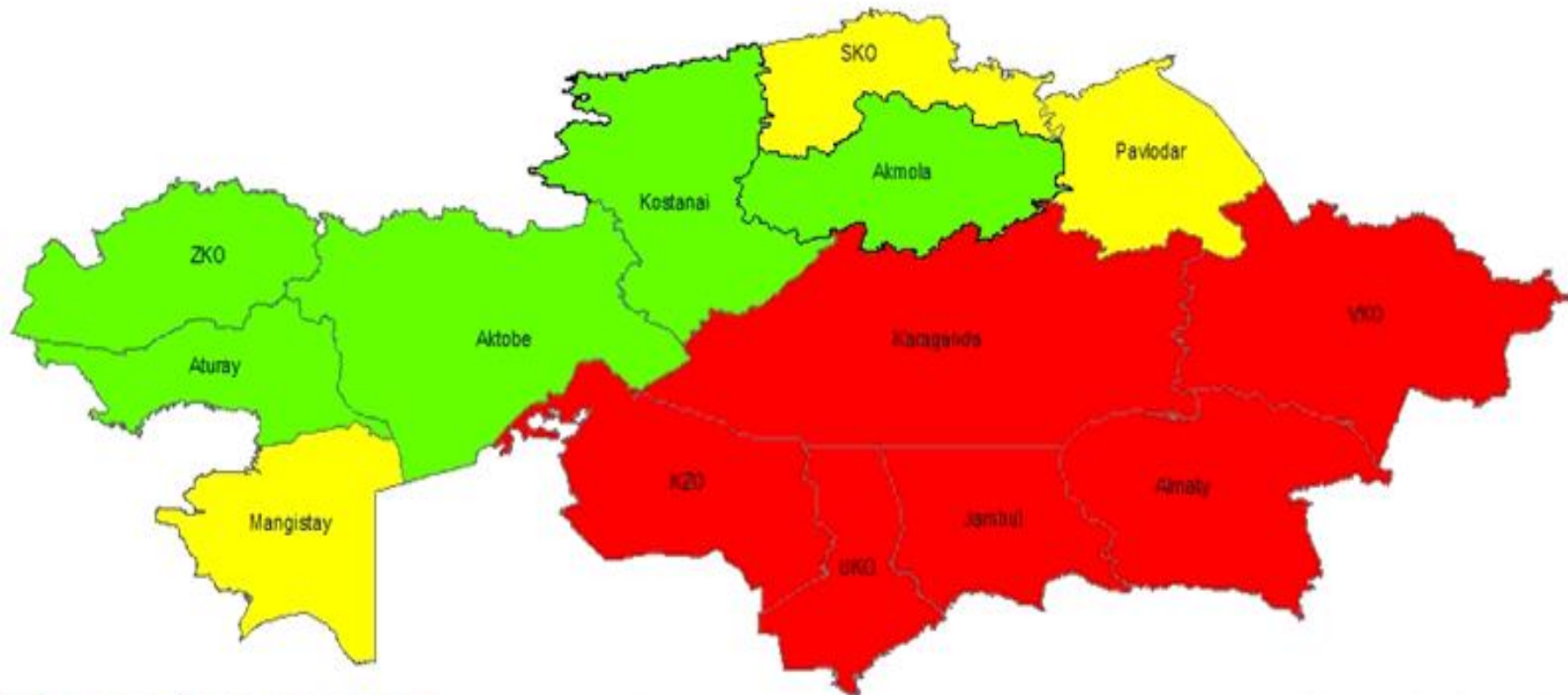
## Irtysh river

- Most of the surface waters in Kazakhstan is also polluted by industrial effluents, pesticide and fertilizer residue, and, in some places, radioactivity. The largest waterways are Irtysh, Ishim, Ili, Syr-Darya, Ural, Shu, Talas rivers.



Soil is the basis for agriculture. All vegetation for human food and animal feed depend upon soil. Enormous quantities of waste from man-made products are being released into the soil causing soil pollution. Polluted water also causes soil pollution. Soil pollution is caused due to unhygienic habits, agricultural practices and inappropriate methods of disposal of solid and liquid wastes. Soil pollution is a also caused as a result of atmospheric pollution.





- зона высокой степени риска заражения
- зона средней степени риска заражения
- зона низкой степени риска заражения



# Asia

ArcGIS 8 Development Team

Source: ESRI Data & Maps CD  
Created in ArcGIS 8 using ArcMap







In industrialized countries, soil pollution is a result of use of chemicals in agriculture, dumping of waste materials, mining, smelting of metals and also dumping of domestic refuse and solids, untreated sewage and industrial wastes.

**When humans add something to an environment, the added entity is known as a *Contaminant*.**

a contaminant is a substance present in **greater than natural concentration** as a result of human activity that causes deviations from the normal composition of the Environment.

**A contaminant is a *Pollutant* when it harms the environment**

a Pollutant is a substance present in **greater than natural concentration** as a result of human activity that has a net detrimental effect upon the Environment or one of its components.

**A Pollutant becomes *Toxic* (a "toxicant") when it harms one or more biota within the environment.**



a Toxic Pollutant is a substance present in **greater than natural concentration** as a result of human activity that has a net detrimental effect upon the life functions of one or more biota of a given Environment.

# Conclusion

It should be noted that along with population growth, industry development, urbanization that transform nature of human activities, in particular increase of agricultural industry productivity, agricultural areas on the earth surface are constantly reduced. The reduction of planet productive lands fund is also due to the process of desertification – development of desert zones due to natural processes caused mainly by people.



- A number of ways have been suggested to curb the pollution rate. Attempts to clean up the environment require plenty of time and resources. Some the steps to reduce soil pollution are:
  - Ban on use of plastic bags below 20 microns thickness.
  - Recycling of plastic wastes.
  - Ban on deforestation.
  - Encouraging plantation programmes.
  - Encouraging social and agro forestry programmes.
  - Undertaking awareness programmes.

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