

**Code of Conduct  
for nature-users  
of the Azov and Black Seas  
Coastal Zones  
Ukraine**

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## **Acknowledgement**

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# **TABLE OF CONTENTS**

## **FOREWORD**

### **I. INTRODUCTION**

### **II. STRATEGIC PRINCIPLES**

### **III. GENERAL GUIDELINES**

### **IV. AGRICULTURE**

### **V. COASTAL DEFENCE**

### **VI. DEFENCE (MILITARY)**

### **VII. ENERGY**

### **VIII. FISHERIES AND AQUACULTURE**

### **IX. FOREST MANAGEMENT**

### **X. INDUSTRY**

### **XI. TOURISM, RECREATION AND LEISURE**

### **XII. TRANSPORT**

### **XIII. URBANISATION**

### **XIV. WATER MANAGEMENT**

### **XV. TERRITORIES OF SPECIAL CONSERVATION CONCERN.**

### **NATURE-PROTECTED FUND**

## Foreword

In Ukraine it is the sea coastal zone that undergoes anthropogenic influence and is under the biggest threat. In accordance to the results of scientific investigations sufficient part of Ukrainian sea shores are under the thread of nature ecosystems destruction. There several major reasons for this: high density of settlements, industry, roads, pipelines, power-industry, big sea ports. Sea ecosystems are very productive but rather vulnerable and sensitive to those people activities that are harmful for environment. In the same time coastal shallow waters are the nature nursery for the most of industrial fish species, shellfish and crayfish. Tourism in the maritime regions is financial source for local population, resistant sea shore line provides effective protection against sea cataclysms and raising the sea level due to climate changes. The negative impact on coastal and marine ecosystems would increase, influenced by the migration process of population form the continental part towards the coastal zone, if the people keep the slogan: "Industry - first of all".

Contradicting this tendency the European Union for Coastal Conservation (EUCC) in 1993 has suggested the Concept of Pan-European Code of Laws for the conduct concerning coastal sea zones. It was developed as activities for managing the NGOs, local authorities other subjects which use coastal nature resources taking into consideration reasonable, ecologically sound social-economic development within coastal zone.

In 1995 the ministers of Environment have accepted the proposal as constituent part of Pan-European Biological and Landscape Diversity Strategy (PEBLDS). The Strategy is the part of European Action Programme for implementing the Convention on Biological Diversity which was reconciled during UNCED summit in 1992 in Rio-de-Janeiro. Different organisations, including Council of Europe, UNEP, IUCN, ECNC, Conventions etc. support and co-ordinate the Programme. It is supposed that next 20 years the Strategy will facilitate joining the principles of biological and landscape diversity conservation with sustainable development in socio-economical domain. The Strategy provides background for implementation of 11 Action Themes including those of protection of coastal and sea ecosystem (Action Theme No.5).

The Draft of the Code of conduct concerning coastal sea zones strives to join the modern views which were revealed in existed laws, action plans, principles referring to the management of coastal sea zones in general and in special types of economies. So far such document have to far binding features. Suggested Code introduces the approach of balancing between binding requirements and the best modern technologies taking into consideration both economical and ecological conditions. The Code does not act as imperative: "Don't do...!" It aims to make practical support and vital recommendations for achieving sustainable development in coastal zones. We do hope that this approach would lead to better dialog between stackholders as well to better understanding among the subjects playing crucial role in integrated coastal zone management.

Some of the recommendations and indications, placed below, are supposed to be of partial use. Nature user would be encouraged to develop their own creative approach.

Text of the document is often used different terminology concerning coastal issue, but the idea behind this was not to do the exact definition. Besides, in the literature on this theme there are many various definitions of the terms. Therefore it is expedient to put interpretation of some terms:

- Coastline - boundary between land and sea.

- Coastal zone – an area including both land and sea. It includes a part of land within seashore administrative units of a base level, and also internal and territorial sea.
- Coastal strip – a narrow strip of land bordering the coastline, extending some hundreds meters in depth of the land.
- A coastal area or region – general term describing places that are influenced by their proximity to the sea.

According to the legal environment of Ukraine the document, similar to the Code, is offered to be defined as *The Rules of Natural Resources Users Conduct for Coastal Zones of the Azov and Black seas* (hereinafter - Rules).

The practical leading **guidelines** concerning protection of a nature and conservation of a landscape and biological diversity in coastal areas of the seas, fully take into account the fact that socio-economic development of these regions will last in further. These Rules take into account direct consequences of economic activity in the region, as well as indirect consequences as a result of environment contamination influencing health of people and sustainability for living-being of populations of plants and animals. Also, Rules concentrate attention on key problems of the following fields of economic activity:

- Agriculture
- Coastal strip protection
- State defence
- Energetics
- Fishery and aquaculture
- Forestry
- Industry
- Tourism and recreation
- Transport
- Urbanisation
- Aqueous facilities(economy).

# I. Introduction

## Definition of a coastal zone of the seas:

" The coastal zone of the seas may be defined as the area where land and sea interact with its landward boundary defined by the limits of ocean influence on the land and the seaward limit being the limit of influence of land and freshwater on the coastal ocean, or put another way 'that part of the land affected by its proximity to the sea and that part of the ocean affected by its proximity to the land' The inland and ocean boundaries are not however spatially fixed ..." (IUCN).

The Coastal zone is the interface where the land meets the ocean encompassing shoreline environment as well as adjacent coastal waters... The limits of the coastal zones are often arbitrarily defined, differing widely among nations, and are often based on jurisdictional limits or demarcated by reason administrative ease... For practical planning purposes, the coastal zone is a special area, endowed with special characteristic, of which the boundaries are often determined by the specific to be tackled" (World Bank)

" A Coastal zone (the object of coastal zone managing) is a geographically delineated area. It is distinctively characterised by the aggregation of interacting coastal environment and corresponding natural and man-made structural systems. " (World Coastal Conference)

"... The coastal zone is defined as a strip of land and sea territory of varying width depending on the nature of characteristics of the environment and management needs. It seldom corresponds to existing administrative or planning units. As to fisheries, it is common to limit the coastal zone to territorial waters according to the Convention on the Law of the Sea, although this limit does not correspond to any distinct biological or management unit. The natural coastal systems and the areas in which human activities involve the use of coastal resources may therefore extend well beyond the limits of territorial waters and several kilometres inland" (European commission).

## **II. Strategic Principles: Code of Conduct for nature-users concerning sea Coastal Zones**

Pan-European Biological and Landscape Diversity Strategy (PEBLDS) defends a number of principles for the sake of gaining its objectives. The rules define these principles concerning processes of development and management of coastal zones.

### **PRINCIPLES OF PAN-EUROPEAN BIOLOGICAL AND LANDSCAPE DIVERSITY STRATEGY (PEBLDS)**

### **COASTAL PRINCIPLES AND KEY ELEMENTS FOR MANAGEMENT**

#### **Principle of Careful Decision Making**

Decision, relating to the Strategy, are made on the basis of the best available information and, as far as is possible and appropriate, adopt economically and socially sound measures that act as incentives for conservation and sustainable use of biological and landscape diversity

#### **Integrate Sectoral Development in Coastal Zone Management**

Where possible opportunities should be taken to promote development of socio-economic sectors in an integrated way, taking careful account of the local carrying capacity. Such development should always be subject to comprehensive environment impact assessment to ensure that the local carrying capacity will not be exceeded over the short or long term. In addition, activities within river catchment areas which affect the coastal zones should be incorporated into river catchment protection schemes. This applies in particular to activities which affect sediment transport and water quality, including activities which generate coastal litter.

#### **Principle of avoidance**

Introduction of appropriate procedures requiring environmental impact assessment of projects that are likely to have significant adverse effects a biological and landscape diversity, with a view to avoiding such effects and, where appropriate, allow the public participation in such procedures.. This would include projects concerning introduction into the natural environment of exotic species, or of the release of generically modified organisms.

#### **Non-Development Zones**

Non-development zones should be established in order to preserve undeveloped stretches of coast for the use of present and future generations. And where necessary to protect coast from flooding, sea level rise, and/ or erosion of soils. Such a zone should include all marine and intertidal areas and coastal ecosystems and habitats, plus an additional protected zone for landscape protection and buffering from accelerated sea level rise generally from 100 - 300 meters from the mean high-tide mark (or within a prescribed contour within which elevated sea levels might be expected) and some distant seaward. Non-development zones should also be established within 50 - 100 meters distance of riverbanks. New projects requiring major land reclamation, dredging or protection in the form of coastal defence engineering works should be avoided.

### **Precautionary Principle**

Action to introduce appropriate procedures to avoid or minimise potentially adverse impact of activities on biological and landscape diversity, ought not be postponed if causal links between those activities and impact has not yet been fully confirmed.

### ***Principle of Translocation***

*Those activities, which represent the special threat and cannot be avoided, should, where possible or practicable, be relocated to areas where they will cause less impact.*

### ***Principle of Ecological Compensation***

The harmful effects of physical changes in areas with high biological and landscape diversity value, which cannot be avoided, should be balanced by compensatory conservation measures by the user.

### **Principle of Ecological Integrity**

The ecological processes responsible for the survival of biological species should be protected and the habitats on which their survival depends maintained.

### **Principle of Restoration and (Re)creation**

Where possible biological and landscape diversity should be restored and/ or (re)created if it can be demonstrated by reference studies that the original state could be re-

### **Protection Coastal Land- and Seascapes**

Coastal landscapes - one of the most valuable and attractive landscapes in country. Much of this is derived from their natural and cultural character and those areas that remain should be protected from development the scene that these values are destroyed. The sites of natural coastal landscapes should be defined as lands, which are subject to the special protection.

The most special areas should remain free from all but the most limited development required to make areas accessible and maintain their visual integrity (aesthetic value).

### **Protection Human Lives and Settlements**

The coastal zone serve an important function in the protection of human lives and settlements. Coastal protection should therefore contribute to the safety of the people who live there.

### **Preventing the Introduction of Alien Species**

The introduction of alien species for example through aquaculture, shipping, land restoration carries great risk to natural ecosystems and steps should be taken to prevent such introduction. It is necessary to eradicate the forest plantations, in which not indigenous trees are used, or to replace those with such, that will promote nature-protecting purposes.

### **Only Coast-Dependent Activities in the Coastal Zone,**

The scales of activity in coastal zones should be appropriate in relation to the natural, cultural and physical characteristics of an environment, and should ensure the preservation of the local cultural heritage. Many coastal zones are already highly developed and there has been a considerable loss of habitat while substantial areas continue to be put under the great pressure. New developments, which do not completely depend on the coastal environment should be located outside of the coastal zone. Existing activities in sensitive coastal habitats which are harmful to coastal ecosystems should phased out. Potential development sites In built-up areas should be reserved for future (sustainable) developments which require coastal location..

established where practicable, and thereby adopting measures for the recovery and rehabilitation of threaten species and for their reintroduction into their habitat under appropriate conditions.

### **Principles of Best Available Technology and Best Environmental Practice**

As defined by the Paris Commission regarding activities that affect biological and landscape diversity, the implementation of modern technologies is the very important factor for achieving the purposes of Pan-European Strategy. It is important, if possible, to provide and/ or to ensure access and transfer for disposal of other countries of those technologies, which have the direct relation to protection and rational usage of biological and landscape diversity.

### **Polluter Pays Principle**

Costs of measures to prevent, control and reduce damage to biological and landscape diversity should be born by the responsible party as far as possible and as appropriate.

### **Principles of Public Participation and Public Access to information**

Create sufficient and active public support of measures regarding biological and landscape diversity by involving public and private landowners, the scientific community, and other individuals and civic groups using land and sea resources in decision-making

### **Zero-Net-Loss of Coastal Habitat**

Outstanding natural features and landscapes as well as important flora and fauna habitats should be afforded strict conservation status. When less valuable sites are identified for development or use, however, another of like or larger size should be created and protected. Existing levels of coastal habitat therefore should be preserved, and where possible, increased

### **Maintain and Enhance Coastal Processes**

Preservation of the natural character of dynamic systems, would enhance the resilience of the coastline against coastal erosion and accelerated of sea level rise. Sediment transfer (from land to sea, from sea to coast and along the coast) is a rejuvenating process and provides the basis for the development of the diversity of coastal systems. Physical barriers, which impede these processes not only destroy the natural dynamic value but also may cause unforeseen and costly damage to other components of environment. When coastal protection is considered necessary, it is usually more effective to work with natural processes than against them; natural materials found locally should be used (for example, sand, shingle) rather than hard structures. As far as possible there should be no further expansion of barriers in particularly sensitive ecosystems.

### **Prevent Habitat Fragmentation**

New developments in the coastal zones of the seas preferably should be located adjacent to (and landwards of) existing developments or where natural characteristics of the coast have already been compromised. Natural habitats, particularly dynamic habitats and those which straddle both land and sea, should not be further fragmented.

### **Creation and Maintain Ecological Corridors**

*Many mobile species require series of habitat, or stepping stones along a migration route. Thus are formed links of a chain, which may be of paramount importance to the survival of the species. Breaking these links could adversely affect the species leading ultimately in the worst cases to extinction. Aquatic animals (notably fish) move between river and marine habitats, and even from between seas, sometimes over very great distances. Many marine mammals and*

processes, through media, and the inclusion of these topics in education programmes.

seabirds rely on coastal habitats for breeding, and spend most of) their lives migrating between land and sea. Each of these involves the use of a corridor, which can be discrete (a series of stepping stones) or continuous (such as a sea strait). Maintaining the natural integrity of corridors therefore is of paramount importance. In some cases, additional measures may need to be taken including restoration of degraded areas or restrictions on sectoral use. This requires an understanding of where corridors exist and how they operate.

### **Coastal Habitat Re-creation**

Habitat re-creation is a measure of last resort, given that new habitats are rarely as diverse as those they replace. Important habitat sites therefore should be excluded from development plans. Where habitat re-creation is used as a compensatory mechanism for less valuable sites, however, new habitats should be created prior to the destruction of an existing habitat, and should be of equal or greater size and value than that which is being destroyed.

### **Contaminant-Free Construction and Reclamation**

Materials used for coastal infrastructure should not include contaminants which might enter marine or coastal ecosystems. This applies not only to structures such as dykes, piers and sea walls, but to sand and soil used for the purposes of land reclamation or beach nourishment

### **Conservation and Rational Usage of Water Resources**

The depletion of groundwater is of increasing concern. Waters for coastal habitats - wetlands, deltas, lagoons - is becoming increasingly scarce due to competition from agriculture, urbanisation, tourism and industry. Climate change is expected to worsen this situation. Water conservation should be a primary concern in all development, with water saving technologies incorporated into all designs

### **The Coastline as Public Domain**

The coastline should be considered as a part of our natural heritage, and private ownership of the coastline should be avoided. In principle, the right of public access to the coast should be guaranteed but

restricted as necessary to avoid conflict with the conservation of natural values. Decisions concerning coastal development should be taken with the full involvement of the public.

### III. General Guidelines

#### 3.1 Integrated Coastal Zone Management

In these Guidelines the term Integrated Coastal Zone Management (ICZM) will be used generically to refer to the full range of approaches pertaining to both planning and management, as applied to both land and sea components of the coastal zone.

##### *Definitions of Integrated Coastal Management*

“ICZM is a continuous process of administration the general aim of which is to put into practice sustainable development and conservation in coastal zones and to maintain the biodiversity. To this end, ICZM seeks, throughout more efficient management, to establish and maintain the best use and sustainable levels of development and activity (use) in the coastal zone, and, over time, to improve the physical status of the coastal environment in accordance with certain commonly held and agreed norms.” – European Commission

“Integrated Coastal Zone Management (ICZM) is a governmental process and consists of the legal and institutional framework necessary to ensure that development and management plans for coastal zones are integrated with environmental (including social) goals and are made with the participation of those affected.” – World Bank

“ Integrated Coastal Zone Management (ICZM) is defined as an adaptive process of resource management for sustainable development in coastal areas. Sustainable development requires that the quantity and quality of coastal resources are safeguarded in order that they not only satisfy the present needs but provide a sustained yield of economic and environmental services for future generations.” – UNEP

“The concept of Integrated Coastal Zone Management -ICZM- aims to build a platform for different authorities, sectors, interests and communities, to focus on the interaction between various activities and demands for natural resources in coastal zones, with the common objective to achieve an ecologically sustainable development within a specific geographical area.” - HELCOM

The ICZM approach is meant to replace development and planning models that deal only with single issues, or are implemented by individual administrative units. It is the continuous process, that proceeds before, during and after the process of branch planning. Therefore concept of integration covers a wide spectrum of the factors:

- Integration of planning and development by the full range of socio-economic sectors;
- Integration of approaches at different levels of administrative units (international, national, regional, local);
- Integration of economic, environmental and social issues;
- Integration of planning and management across geographic components of the coastal zone;
- The integration of planning within the framework of changeable categories of time - from long-term (50 years and longer) to near-term (for example, annual) programs;
- Integration of the knowledge, understanding and views of different scientific disciplines, NGOs and the public.

The process is meant to combine physical, biological and human elements into a single management framework, which embrace both continental and marine components of coastal zones and ensure that the most important issues receive the highest priority of attention. At its best, it also takes account of the coastal ecosystem as a whole, regardless of differing administration or jurisdictional units. With regard to branch and sectoral integration, it is important to note that ICM is not a substitute for branch planning, but avoids fragmentation by focussing on the linkages between different sectors and makes the possible agreed common operations.

#### *The General Premises for Creation of the System of Integrated Coastal Zone Management*

For introduction of the system of ICZM, it is necessary the presence of political volition and tendencies to settle conflicts, which exist in a coastal bar. Administrative, legislative and economic base for execution of accepted solutions should be created.

#### *The Benefits of Integrated Coastal Management*

The benefits of the ICZM approach are not always simple to define. It is easier to describe the problems that could arise in the absence of ICZM:

- Unnecessarily reactive management: responding to problems which could have been anticipated and avoided after the fact;
- Cumulative impacts: where the many small decisions made by different levels of government add up to major problems for the coastal environment;
- Transfer of problems from one sector to another;
- Predominance of short-term economic interests above ecological once: often at the expense of natural resources and the environment, and in many cases having a negative long-term economic impact;
- Fragmented geographical planning: lack of co-ordination between managers of land and marine areas, or neighbouring communities bordering a single coastal ecosystem.

In short, it can be argued that a lack of integrated planning and management will almost surely result in the degradation of the coastal environment and in the negative socio-economic tendencies for long term. ICZM will only promote sustainable coastal development if this is an express goal of the planning process. If this goal sits at the top of the agenda, ICZM can be a useful way of avoiding the problems described above.

#### *Developing Coastal Zone Management Plans*

There is a series of steps generally considered to be essential in developing ICZM plans:

- Preparation of detailed and appropriate baseline information about the physical characteristics of environment of coastal zone and its ecosystems, cultural features, and establishing the geographical scope of the plan;
- Determination of mechanisms to ensure public participation in the process;
- Assessment of the role of past and present management in molding the existing coastal landscape and analyzing the feasibility of new development,
- Assessment of existing management and legal structures and establishing the necessary institutional, legal and administrative framework for integrated management;
- Undertaking an audit of good and bad elements within the natural and human matrix and identifying priority issues;
- Setting clear objectives and priorities for planning and management as well as for all branch activities;

- Drawing up the initial plan and proposed projects, including economic incentives to support rational resources usage;
- Environmental and strategic impact assessment of the proposed plan and projects;
- Public comment on the proposals, based on information which is made freely available throughout the process;
- Implementation of the plan;
- Monitoring and evaluation of the outcome;
- Taking of the scheduled measures and mechanisms of response on unforeseeable situations, which can arise at various phases;
- Review and revision of plans as results become available, or as new circumstances arise which require changes in the plan.

#### *Social and Economic Goals to Ensure Durable Sustainability*

Promoting a socially and economically sustainable local population is a necessity for long-term maintenance of coastal areas. In developing coastal management plans, there is a need to encourage innovative, low-impact economic activity, possibly including more commonly proposed solutions such as low-impact educational, agricultural tourism and other kinds of low-impact activity.

#### *Classification and Vulnerability of Coastal Landscapes*

For the purposes of management and planning, coastal landscapes can be divided into two major groups. The first consists of cliffed and rocky coasts. The second can be described as coastal plains. The tidal range of coastal waters is another important factor in describing the nature of coastal landscapes. All coastal areas are vulnerable to development which destroys natural habitat and/or interferes with natural processes. Generally coastal plains have been most heavily affected as they are often associated with rivers, estuaries and deltas where settlement by ports and harbors and other touristic and urban developments have been concentrated. Enclosure of tidal lands in these areas has greatly reduced the area of the zone and with it their natural resilience by introducing artificial barriers which may aggravate coastal erosion and other problems. Thus, if left to themselves dynamic habitats in most coasts are able to withstand perturbations in the environment such as storms and sea level rise. They are less resilient when constrained by human activities and uses.

#### *Assessing Environmental Impacts (EIA)*

The process of environmental impact assessment is one of the most important steps in the coastal planning process. It is a procedure designed to identify the potential consequences for nature and the environment arising from development. This information is then used by decision-makers to assess whether or in what form proposed activities should go forward. Impact assessments can be carried out on a broad scale in order to evaluate the consequences of an entire programme consisting of many individual projects (known as Strategic Environmental Assessment), or on a smaller scale to evaluate potential impacts from the individual projects themselves.

Such assessments should include:

- Screening: The procedure for determining whether a particular proposed activity (project) will require a full EIA or a less rigorous environmental planning procedure.
- Scoping: The procedure for determining which issues are likely to be important and should be examined in an EIA.

- Production of an Environmental Impact Assessment or Statement: The document which describes the potential environmental impacts of a proposed activity. It should also contain a discussion of possible alternative courses of development, including a non-development option, along with an analysis of their potential environmental impacts. In addition, the EIA/EIS should describe how eventual impacts will be monitored and any mitigation techniques that will be applied.
- Baseline Studies: A detailed description of present environmental and socio-economic conditions against which subsequent changes can be assessed.
- Review: A review of the EIA/EIS is undertaken and its acceptability assessed.
- Decision: A decision is made regarding whether or in what form a proposed activity can proceed.

Consultation and public participation and the transparency of decisions are integral to the process of environmental impact assessment. When vigorously pursued, and begun at the earliest stages of a project, the benefits of public consultation and participation can be significant. For example, if controversies are discussed early in the process, while there is still time to alter plans and mitigate possible damages, there is a greater likelihood of eventual public commitment to or acceptance of decisions. This may help to reduce costly delays later in the process.

#### *Economic Instruments and Incentives*

Economic instruments and incentives, if applied properly, can be an effective and economically efficient means to promote environmentally sustainable development in the coastal zone. They rather encourage than constrain changes in norms of behavior, and also do constant pressure permanently. However, there are many theoretical and practical limitations to this approach that policy makers should consider before deciding upon this approach or upon which instruments to apply. A few of the most important difficulties include: how to value nature and other non-monetary benefits derived from coastal areas; how to avoid a disproportionate impact on lower income groups; how to avoid undesirable market distortions and impacts on competitiveness; and how to incorporate the value of coastal resources to future generations.

Nevertheless, the use of economic instruments and incentives can help to internalize external costs such as damage to the environment, and induce companies and individuals to achieve environmental goals in a cost-effective manner. They gain of the special significance when the command measures are unacceptable or can have negative consequences. They may also spur innovative approaches to environmental problems. Finally, the potential for such instruments to raise revenues for re-investment into further measures to reduce environmental impacts should not be overlooked.

Among main economic tools it is necessary to mark such as following:

- Eco-taxes: Polluters are required to pay a tax on each unit of pollution emitted in order to raise the cost of polluting to the level of the social costs incurred as a result of these emissions.
- User charges: Users of services and products (or nature areas) are charged a fee that covers the full cost of using that service or product.
- Subsidies: Companies or individuals are given cash rewards for producing or using products or services which are beneficial (or less harmful) to the environment.
- Rights based instruments (e.g. emissions trading): Rights to use or pollute environmental resources are provided up to a pre-determined limited. Excess rights can then be traded or sold.

## 3.2 Leading Guidelines on Integrated Coastal Zone Management

*The process of the ICZM requires effective legal and administrative tools*

Before any plan is produced it is important to agree which issues will be addressed, and at what level of priority, through a process of discussion between the relevant sectors. The mechanism used to undertake this will be important since everyone with an interest should feel that their concerns have been taken into account. One method of achieving this is to use the data gathering process as a means of bringing the sectors together in environmental issues forum which may help overcome the normal institutional barriers to meaningful dialogue.

National, regional and local authorities should ensure that all development occurs within the context of an integrated coastal management plan, in which areas are designated for certain kinds of development or as areas to be left free from development altogether (although even development-free areas may require some degree of managing). A zoning system designed to facilitate choice of that or other method of management, that would be optimal for the given area, could be helpful in this regard.

ICZM Plans should attempt to establish the carrying capacity of the coastal and marine environment, taking into account the vulnerability of coastal landscape types and ecosystems types, and ensure that development is not allowed to exceed this capacity. ICZM plans should specifically recognise the need to conserve nature as a precondition for all development, as this is the only way to ensure that development is truly sustainable. The geographical scope of ICZM plans should be large enough to encompass the ecosystem as a whole as one or several administrative areas may be insufficiently for it.. Involvement and cooperation between neighbouring communities and countries should be encouraged, recognizing the transboundary nature of most environmental threats. Co-operation and information exchange between coastal areas facing comparable threats should also be encouraged.

*Public Participation in Coastal Zone Management*

Sustainable development and management of coastal region requires a combination of top-down and bottom-up approaches; public participation in the process is essential. In order to ensure adequate public participation in coastal planning, decision-making and management, authorities should:

- Make sure that the decision-making process is consultative and open to all parties who want to or should be involved, and encourage such parties to do so;
- Make funds available to those who would otherwise be unable to take part;
- Establish a coastal forum within each affected area for ongoing discussions;
- Ensure that all opportunities for public involvement are well publicized.
- Support educational and mobilization programmes in schools and high schools as well as other community programmes;
- Hold community workshops and/or public meetings
- Involve the public in solution-oriented activities and events;
- Involve the public in management of human activity, that is conducted in coast zone, liquidation of impact within coastal zone and in controlling upon observance of the laws, agreements and other solutions;
- Involve the local businesses in programmes, and work with them to advertise the issues in their outlets;
- Using public service advertisements and other media outreach;

- Use innovative techniques for reaching different audiences and age groups, (e.g. Internet-based projects, displays and exhibitions, artistic events)

Techniques that can be used to assess public opinion include:

- Questionnaires and surveys
- Telephone hot lines
- Internet-based bulletin boards
- Citizens' Advisory Committees
- Public hearings and inquiries

### *Strategic Assessment of Possible Environmental Impact*

The unique problems and pressures on the coastal zone should be recognized when deciding which developments require an Environmental Impact Assessment (EIA). Development inland might be considered benign whereas the same activities, if carried out in the coastal zone, may be likely to have severe impacts. A precautionary approach should be taken in the EIA screening process whereby if there are doubts about the potential for a proposed activity or programme to cause significant impact, an EIA should be undertaken.

According to rules of the Environmental Impact Assessment and protocol of the Environmental Impact Statement (EIA/EIS) the alternative of desirable kinds of activity should differ significantly. Alternatives should not only consider different locations of the same activity.

The cumulative effects of development in the coastal zone should be considered in the EIA process. The EIA/EIS should demonstrate how the proposed activity fits with coastal policies, programs and plans by international, national, regional and local governments.

Public participation in the EIA process should be vigorously pursued at all stages of project planning:

- When specific new projects are planned, public hearings should be held to solicit views at the earliest possible stage (i.e. scoping), before vested interests take hold and certainly prior to taking any decision about whether to proceed;
- If needed, funds should be provided in order to allow affected groups to participate;
- Public opinion should be incorporated into the plans, and a mechanism for appeal should be available where this has not occurred;
- For particularly controversial decisions, a public referendum should be considered;
- Make all consultants reports, feasibility studies, safety studies, cost reports, etc. publicly and conveniently available;
- Publish regular reports to keep people informed about the latest developments;
- Establish public advisory groups to allow continued involvement while the project is being carried out, or designate public representatives on formal committees;

### *Economic Instruments and Incentives*

The use of economic instruments and incentives should be incorporated into ICM plans. The effectiveness of such instruments should be regularly reviewed, and adapted as necessary to achieve the desired goals.

In setting values for the non-monetary benefits of coastal conservation, long-term considerations such as the potential for coastal ecosystems to act as a buffer zone from accelerated sea level rise and as a sink for nutrients, should be taken into account.

Emissions and products taxes should be set high enough to serve as a disincentive to buy or use products or services that are destructive to coastal ecosystems.

Existing subsidies for activities that are detrimental to the conservation of biological and landscape diversity should be denounced and prohibited.

Revenues raised as a result of the application of economic instruments should be re-invested in activities that will promote the conservation of biological and landscape diversity. The establishment of a Coastal Zone Fund could be considered, for example. Green investments should be encouraged by making profits on such investments tax-free.

Any impacts on lower income groups that result from the use of economic instruments should be offset by a decrease in taxes or provision of subsidies for activities that benefit biodiversity.

#### *Coastal and Marine Protected Areas*

Establishing coastal and marine protected areas should be considered within the context of coastal management programmes. While the primary purpose of a protected area is to conserve natural complexes, it does not necessarily require the cessation of all human activities within the area. A variety of uses may be permissible within a protected area, provided that sufficient controls exist to ensure sustainable use of resources.

The success of a protected area designation depends upon a variety of factors, including: definition of the area so that it can be managed as a discrete unit; acceptance by local inhabitants; the existence of appropriate legal and administrative frameworks and reliable executive bodies.

## IV. Agriculture

### 4.1 State of the art and trends of development

Agriculture is one of the biggest and the most important field of production that have very strong negative impact on sea coastal zones in Ukraine. It influences not only littoral lands but waters of the Black and Azov seas, especially near the shores of Odesa and Kherson oblasts and Autonomous Republic of Crimea (Sasyk, Sivash, Tendra, Dzharylgach and Krkinitska bays).

Nowadays agriculture has for sure great importance as for providing the working places, making products and occupying specific territories. Opposite to developed countries of Europe, Ukrainian agriculture holds much more workers (both in relative and absolute figures). However the partial weights of the branch in gross domestic product is lower and reveal the tendency to decrease. The trend was speeded in last years. For the 1991-1993 partial weight of agriculture in the bulk of value added has shrunk from 25,5 to 21,6 % or on 3,9 % points. Furthermore in 1994-1996 this shrinkage consisted from 21,6 to 13,0 % or 8,6 % points. Average years number of agriculture workers depleted for the 1991-1996 on 375,7 thousand people of employable ages and makes up 3,3 mln. people in 1996 year. Taking into account 8 mln. people living in the villages at January 1, 1999, partial weight of agricultural employee (not including domestic economy) makes up more then 40% (comparing to 6% of those in EU-countries in 1992).

Rising the productivity and increasing import are the reasons for sufficient declining of employment in agriculture. It was conducted by reducing arable land plots. As the result the agriculture has passed through vast changes influenced by economical reforms.

In accordance to the research, having been made in the course of preparation of National program for land protection in Ukraine, the trends would result in:

- General reducing of arable lands though conversion into pastures or forests - at least on 2.6. mln. ha;
- Part of agricultural lands would be converted into semi-natural areas by restoration of native plant species;
- Productivity of the rest of agricultural fields would be considerably rose.

### 4.2 Consequences

Both types of agriculture - planting and animal-breeding traditionally occupy tremendous land areas. A lot of land plots around rivers and lagoons were reclaimed into agricultural fields by means of daces, dams, cutting and firing woods. Nowadays the process of land reclamation has been almost completely halted due to increasing the land productivity followed by overproduction in some part of the globe. Moreover cheap imported products are often dislodging more expensive home-made products. Grazing still is the important factor of coastal land use. It also seriously affects land cover featured by far-between plants, sand, wetlands, shore land-slides. Wild animals used to graze there but livestock carries sufficient impact on meadows, sand dunes, waste lands in moderate climate conditions leading to their expansion and even improvement. Uncontrolled overgrazing can cause land erosion and loss of plant cover albeit withdrawing all the animals from the territory could harm it by shifting the native plant composition which have been adapted to regular grazing.

Ukrainian peculiarity is active development of rice-growing within coastal zones of Kherson, Odesa oblasts and Autonomous Republic of Crimea for the last 35 - 40 years. The area of 30 thousand ha is used for special rice crop-rotation. Herbicide technology is used. Each hectare of rice field consumes 25-30 thousand cubic meters of irrigated water per year and 40% of water is discharged in sea. It causes drastic changes of hydro-chemical regimes of water reservoirs and aggravation of region's ecological situation. 160-180 mln. cubic meters of waters are being discharged per years including 85-100 of that discharged in Sivash. Apart of this the rice fields are treated by fertilisers (1.5 - 2 t per ha) and pesticides (30 - 40 kg per ha). Remainders also pass with water to sea bays.

Rice paddies were located mainly along coastal line (including 2-km protected strip). Circulated water solutions of pesticides, fertilisers, organic matters lead to degradation of littoral waters, destroying ecosystems that having been formed there during millenniums.

Contamination of agricultural lands with radioactive isotopes is another peculiarity of Ukraine cause by Chornobyl' disaster. Lands of 74 raions of 11 oblasts were contaminated. Land territories that have been suffered from different level of radioactivity amounted relatively: 3.5 mln ha - up to 1 Ku per sq m, 0.95 mln ha - 1 to 5 Ku per sq m, 116 th.ha - 5 to 15 Ku per sq m, 32 th.ha - more then 15 Ku per sq m and 55 th.ha were estrangemented within 30-km zone. Some 20% of Ukrainian territory was contaminated by Cs-137 with concentrations that exceed normal in 10 and more times. 1991 surveillance for Lower Dnieper water contamination by Cs-137 have shown it level at 3.7-60 mBk per l and Sr-90 - at 142-179 mBk per l. South black lands could accumulate the radioactive isotopes when irrigated by those waters.

Besides of that negative impact the agricultural plots and arable lands are under degradation process caused by wind and water erosion facilitated by too far reclamation of the lands. Due long time the agricultural policy suggested to reclaim even low-productive lands. Slopes, shorelines were ploughed. Wide-scale meliorate works took place stretching river beds, drying wetlands, digging irrigation channels etc. Finally the rate of land reclamation exceeded 70% and ploughing of agricultural lands - 80% that is inadmissible for developed countries.

Over-ploughing of agricultural lands, exhaustion of land fertility, reducing of land restoration activities for the last years are conducted by their degradation and dropping the productivity.

Special research has revealed that for 33.3 mln ha of arable lands 10 mln.ha were eroded, some 17 mln.ha - under deflation processes, more then 10 mln.ha have over-acidity and more then 4 mln.ha were salinised.

Use of chemical fertilisers and pesticides caused serious contamination of surface and ground waters, raising level of acidity in environment. Contamination and eutrofication phenomena, surface discharge, deep penetration of chemicals, changes of hydrological systems led to abrupt decreasing in surface water store.

Land irrigation has led to their salinisation as the phenomenon brings up salt from deep land horizons to upper layers. These lands could be no more used. Drying wetlands, land contamination by fertilisers and pesticides caused damage or ruining the inmoportant coastal habitats throughout the Europe.

Moreover agriculture is responsible for contamination of 45% of total methane (green-house gas) which is formed in the process of decomposition of organic matter.

The process of high rate agriculture industrialising would threaten not only coastal territories but mainlands as well.

### 4.3 Possibilities

Step by step orientation towards ecologically friendly agriculture could provide sustainability for the development of this domain of economy for long future. Moreover the reforms having been suggested by EU countries for General Agricultural Policy become more and more sensitive to environment problems. That is why worrying about environment becomes more important than raising the productivity of agriculture. Some EU Directives concerning environment protection:

- Directive 2843/94 has provisions that recommend facilitating the investments in the programs of environment protection;
- Directive 2078/92 supports protection of semi-natural habitats;
- Article 11a of the Directive 2052/88 sets the criteria for risk factors on environment and agriculture landscapes.

New reforms are necessary for finding new possibilities to promote environment protection. Crucial changes relate to shifting the priorities from raising the productivity to the sustainable development of ecologically friendly technologies.

As far as rice paddies are concerned the measures could envisage:

- Improvement of the structure of rice crop-rotation to reach 50% usage of rice-crop and 30-40% - of alfa-alfa.
- Usage of special treatments to provide decreasing of land density in depth 0 to 50 cm and expanding the period of alfa-alfa planting to 2-3 years.
- Improving the technology of flattening the rice plots (no more than +2.5 cm), increasing part of early-raped rice species to 30-440% from total area, providing resource saving technology, reducing usage of pesticides for rice growing. These activities would facilitate reducing in water consumption on 30-40% and almost twofold for total water turnover for irrigation.
- Constructing closed water circulating systems to prevent direct water discharge into sea bays.
- Creation of water protection zones for small rivers, lagoons and sea, assigning the protected status (of different level) to coastal territories that would facilitate the process of withdrawing the territories from agricultural usage.

Withdrawing agricultural lands from land-use once being wise-planned could address the issue of biodiversity conservation via habitat restoration and raising the quality of environment. In the same time together with sustainable management of vulnerable zones it would support nature conservation within coastal sea zone. Rational management could also envisage expansion of semi-natural habitats on the territories that have been previously heavily exploited (for instance sea shores slopes). In those regions where human activities have converted lagoons into agricultural plots the lands could be inundated and turned into wetlands.

There are other possibilities to improve general status of environment. In accordance to a research report plant cover on restored land territory effectively keeps nitrogen in soils preventing from its migration in water sources and river deltas. Reducing the areas under agricultural usage could decrease the amount of solid soil particles having been drifted by

water to seas therefore improving seawater quality. Water quality improvement in the river deltas would facilitate development of fisheries, spreading wildlife, river shipping.

Expansion of agricultural territories in Ukraine is not forecasted in near future because of low benefits from such expansions.

#### **4.4 General recommendations for holding agriculture in coastal zones.**

##### *Protection of water basins*

There are some measures to protect littoral regions of the coastal strip: anti-erosion activities, marginal technologies for land cultivation, expansion of native protective plant cover. Creation of water-protective strips along the river shore is also of great significance.

##### *Diversification of activities*

Agricultural technologies compatible with environment protection should be invited whenever it's possible, for instance by preparing recommendations, material support or releasing subsidies to farmers.

Land-users are to have incentives to support biological diversity through dissemination of region-specific plants and animals. Farmers are to understand the role of diversification of their activities as additional source of their income developing agri-tourism and restoring environment.

Farmers are to be invited to improve agricultural landscapes, especially marginal by planting live hedges, trees, creating ponds. Whenever necessary farmers are to support steppe birds, wintering and migrating birds.

##### *Grazing*

Livestock density in natural and semi-natural ecosystems must be reduced. Their amount are to be calculated backing by traditional technologies of grazing and local nature capacity. In moderate climate zones only lesser territories could be left without pasturing. In other territories grazing should be renewed for instance on salted wetlands and sand dunes or animal density have to be increased not to hurt soil structure and cover plant biodiversity, because it leads to intensive process of ground erosion. During the seasonal pasturing presence of native breeding species especially birds should be taken into consideration.

##### *Restoration of plant and animal habitats*

Lands having been withdrawn of agricultural cultivation perform good chances for habitat restoration. On these places restoration of native plant cover, rehabilitation of wildlife habitats by planting trees are to be permitted.

There are basic technologies that allow fixing radioactive particles in soils: entering high doses of phosphorus-potassium fertilisers, adding lime-stone to acid soils, cultivation of nature forage plots, marling "clear" pastures for collective and private livestock. Usage of concrete dust (with sufficient content of calcium and potassium) is supposed to be perspective

on contaminated territories as well absorbers, ceolites, glaukanites, vermikulites, phlogopit and other natural silicates of aluminium.

Establishing new agricultural plots within nature habitats (for instance in dunes, wetlands, woodlands) should be avoided and vice versa giving up the human activities in the territories and restoration of their nature values are to be encouraged. The "development maps" or "maps of land-use" should be developed to meet the objective. For sensitive coastal zones group of specialists, including agronomist, ground specialist, phito-sociologist or botanist, could elaborate the development plan embracing agricultural territory, forests, activities for fauna and flora protection.

### *Irrigation*

The level of agricultural productivity should correspond to the level of providing the region by renewable water sources. New irrigation programs, that envisage involving additional subterranean water sources, must be forbidden. They must be underwent the environment impact assessment procedure to protect sources of ground waters.

Usage of artesian water for irrigation purposes is to be avoided. The same is concerned of surface irrigation carrying out by means of inundation of big territories. It is suggested to apply the method of drop irrigation. Channelling the water should be avoided when irrigating steep slopes.

### *Pest management*

Integrated management for entering fertilisers and pesticides have to be planned as constituent part of crop-rotation program.

Such activities as early warning on spreading the pests, biological control, mechanical and handle weeding should be included to the integrated program for pest management. First of all usage of harmful substances in agriculture must be cancelled. It's very important as early as possible to give up the practice of applying in open air the organic substances of tin, phosphorous, chloride, triazene, heavy metals, artificial pirethroides and bromide-methyl. Instead of them it is recommended to use restricted set of pesticides with predictable and already determined follow up.

### *Fertilisers*

Individual as well co-operative farms want sustainability on their work. The amount of liquid and solid manure should not exceed that soil could accept without disturbing the normal process of crop-rotation. Therefore different analysis are necessary: soil structure and composition, manure, plant conditions, outside potential nutrients and dependence of the factors from local climatic conditions, presence of slopes, irrigation systems and activities as well land-use and agricultural practice. Soil analysis could permit introducing the fertilisers that would not thread to the coastal zone where they are used.

Fertilisers are to be entered by a way to avoid loosing nutrients:

- pesticides should not be sprayed from planes since it could spread the chemicals onto vast territories, much more bigger then it was envisaged prior and to destroying the species that must not be damaged.;

- fertilisers should not be entered into frozen soils, over-saturated by moisture or covered by snow;
- liquid manure should be introduced by pointed injection or other effective methods like pipe-lines that could be transported. Liquid manure being introduced should be immediately mixed with soil. The amount of the fertiliser should correspond to crop raising needs or soil properties. Manure should be kept in amount required for future applying.

The floor of premises for livestock should be waterproof, rather durable to avoid destruction. It should be equipped with sinks and collectors for liquid manure.

Liquid and solid manure must be regularly and often removed from the premises and collected outside. Liquid manure must be stored in waterproof ground surrounded by embankment. It must not be stored in open collector. If available the methane should be removed. Poultry's manure should be dried immediately after gathering.

#### *Energy saving*

Farmers have to wish energy conservation through stopping the usage of ineffective agricultural instruments and mechanisms but applying renewable energy sources in their activities.

#### *Pollution*

It is necessary to introduce the systems for cleaning from agricultural pollution or to think about other possibilities. In the places susceptible to fires the agricultural remains better are to be dug or incinerated.

#### *Wastes and ground erosion*

Coastal zone management should provide agriculture with the technologies that prevent ground erosion and loss of nutrient leading to sustainable agriculture.

In winter coastal zone plots should not be left opened or just ploughed. It's recommended to plant/sow wintering crops that consume sufficient amount of nutrient. If the local soil conditions permit low-lands and grape-lands should be permanently be covered by grass.

## V. Coastal defence

### 5.1 Current status and trends

Coastal zone protection is the general term embracing all aspects of people's activities targeted on coastal zone protection from such threats as inundation and ground erosion. Activities addressing coastal zone protection could be of local scale - for protection of relatively small nature objects or embrace vast territories. Relevant systems generally are concentrated in coastal low-lands around towns and sea-ports, tourist centres, industrial complexes and elements of infrastructure. In other words coast protection aims first of all securing economical interests rather than nature complexes.

There is a set of technical measures and technologies for coastline protection that could be applied for different parts of seacoast. There are technologies effective in sea zones, on some distance from shore, like breakwater, artificial bays, sea fences etc. Wave-protecting walls, anti-flood dams are built on the shore itself, on the boundary of high tide or even higher to protect shore line.

There are two approaches for coastline protection:

1. "Hard" technology - means constructions resistant for sea waves action and sea-tide. They are breakwaters, wave-protecting walls for diminishing wave energy, bonds - for accumulating the sediments on the shore and dams and sea fences for protection against raising the sea water level.
2. "Soft" technology - assigned to co-operate with nature through manipulation with nature ecosystems. It's able to adapt to power and energy of sea waves, tides and winds. This technology is much more beneficial for economy, minimising negative ecological consequences of applying "hard" technology.

Modern trends in coast protection envisage the principle of coast management lent upon adaptation to coast nature development rather than contradicting sea power. This trend is clearly revealed in withdrawing from "hard" technologies that hamper nature process of coastal zones. In other hand "soft" technologies suitable for the nature dynamic of seacoast start to be used. "Soft" technologies bring lesser negative impact to environment and require lesser expenses for their support.

Current status and future forecasts predict raising sea level, fiercing storm power due to the climate change. This means following up the activities for coastline protection, fighting ground erosion and flood-protection.

According to the 1995 data of intergovernmental panel on climate change (IPCC), the level of ocean has risen 10 to 25 cm for the last hundred years and might rise up to 15 - 95 cm to 2100 years (the optimists indicate 50 cm). It is obvious that coastal zones would suffer. According to the UNEP prognosis a lot of coastal settlements, bays, ports, inshore motor-roads and infrastructures would be damaged for the next fifty years.

The strategies for coastline protection differ depending on the region covered. If the analysis of benefits and losses concerning coastlines protection takes into account the restoration potential of coastal ecosystems, the places would be find where such places could be restored to nature conditions. They might serve as buffer, nature protection against sea storms fighting the power of sea waves as well accumulating sea sediments and therefore rising the level of sea strip.

One more important technology for coast protection is "artificial" feeding or filling in the shore depositions. The idea is being find growing support both from economical and ecological points of view. Supplementing the beaches envisages growing sand volumes on sea beaches or within coastline through transportation of the sediments to form new profile of the sea beach. Currently deposits are transported directly from the sea shallow waters by hydraulic panning out, albeit sand could be panned out from other sources, say by soil-draw machinery. The technology of supplementing the sea beaches facilitates dynamic protection of coast using nature processes and supporting natural features of the coast and its nature values and properties.

The approach also excludes excavation of deposits on seashore and on the river-beds within delta areas.

## 5.2 Consequences

Consequences of coastline protection depend on methods and technologies applied, their characteristic and peculiarities of local nature conditions. Here are the most apparent consequences from the application of different protective technologies:

- destruction of nature processes in ecosystems and biotopic structure of the beaches, dunes, cliffs and adjacent zones due to partial or complete modification of the relief shapes and sediment processes both in local and regional scales.
- Gradual loss of the ecosystems dependant from the sea like temporary inundated flats and wetlands, wetland forests and active cliffs;
- Increasing threat to biological diversity of coast strip;
- Degradation of nature values.

Consequences from the usage of "hard" technologies are much more hurt then those from "soft" technologies. As the rule "hard" technologies lead to long-term changes in coast morphology especially to sufficient erosion along of all protected coastline. They often lead to narrowing shore strip due to accumulation of soils near the engineer constructions. It in turn leads to reducing the sizes of nature habitats named as "coast contraction". "Soft" technologies are much more ecologically safe since they provide dynamic balance for the coast strip simultaneously reducing to the minimum threats of flooding and development of erosion. They also require larger space therefore avoiding the threats of "coast contraction".

Protection constructions assigned for absorbing the energy of sea waves often bring to accumulation of sediments around the construction. In some cases it causes covering or other changing of the existing coastline ecosystems. "Hard" protective constructions reducing the erosion of higher zone of the shore and slopes in the same time disturb the process of transferring the sediments along the shore. This widens erosion processes on adjacent coast area.

Some construction could aggravate the landscape, restrict access to seashore, and create the thread for shipping and people safety.

Technologies for coastline protection that envisage protection of river deltas by building dykes, malls, wave-breaks etc could sufficiently destroy nature processes.

The technologies of filling if bed planned or if improper material was chosen could lead to high content of sediments in littoral waters. Permanent washing of soluble or high-disperse

substances might have long-term negative impact on benthic and littoral ecosystems. Changing the disperseness of sea bottom could lead to spreading solid sediments into the zones of tide ecosystems like lowering of step slopes or dunes. Quick accumulation of sediments could cover the habitats of invertebrates in littoral zones aggravating feeding conditions for birds.

Water-break walls and other up-water constructions in shore zone if designed too close to water edge constrict active beach zone and dunes pending the sea-storms. It considerably destroys the balance of sea precipitates and leads to development of erosion in particular along low wave line of the seashore. They also lead to strong pushing the waves causing erosion and lowering the seashore covering by water and some times the water-break wall might be ruining due to destroying its basis. Water-break walls disturb transferring sea sediments between beach and dune destroying nature processes.

### **5.3 Possibilities**

Once the sea level rise the width of tidal strip is decreasing due to decreasing the low-tide leaving effect and saving the same boundary for high tide by rigid constructions. In the result sufficient part of nature habitats would be loosed in particular salt marshes and wetlands serving as buffer protective zone. Furthermore this could lead to the walls erosion and ruining. It might happen on very big length of construction thus very big amount of money are required to restore and keep such construction in proper conditions. Understanding the fact of rising sea and ocean level together with developing the idea of "shore contraction" have facilitated to creation the concept of "planned retreat".

"Planned retreat " foreseen taking away "the line of active defence" to the new borders deep inside the continental zone to those preliminary prepared positions located on more higher places They are supposed to support the inter-tidal habitats in the zones between old and new lines of defence. Depending the situation and project requirements old positions could be held until the moment while they would be destroyed in their own way or would be almost or partially removed. The lands determined to serve, as new defence line, would form the new, more wide inter-tidal profile, possessing more abilities to contradict coastline processes and to mitigate the impact of "coastline contraction". The strategy of "planned retreat" is not a policy "to do nothing" but it requires active management. Such a strategy of "planned retreat" has two major predominances. First, taking away defence line has additional element for diminishing wave's power, namely widening inter-tidal zone. Consequently it does not require additional certification or expenditures. Secondly, widening the inter-tidal zone would diminish the threat of "coastline contraction".

Nature conservation capacity should be taken into consideration while developing all programs for protection of coastline. Such programs could provide improving the landscapes and restoration of old or creation of new habitats like salt-marshes, brackish lagoons, artificial rifts. Ecologically safe technological remedies could be applied for keeping the biological diversity of habitats. Even almost ecologically loosen zones often could be restored.

### **5.4 Basic recommendations for coast protection**

Learning the issues of coast protection, factors of sea coastal strip dynamics and trends for constant changes has to be taken into account. The factors are to be considered in the processes of management and planning the coastal sea strips. Relevant nature processes might

be violated in the processes of coastal protection works only when the people's life are under threat or in other critical emergencies. Development of the zones of high risk could be continued if it meets the requirements of program for coast protection and proper level of safety is provided. The project in general, i.g. the programs for development and protection of the coast, are to be incurred to environment impact assessment and it should be proven that they are developing in the long term interests of society.

Environment risk assessment for coastal sea strips should be carried out to determine the consequences of sea level rise following by retreating the coast strip, therefore determining the strategy for planning and development. In accordance to the principles of sustainable and rational development the programs for coast protection must not put the economical burden on future generation or create the deadlock situation. Activities for the coast protection should be the constituent part of the strategic plan for focused seacoast territory where all activities are based upon scientific insight for nature processes of coastal zones and river estuaries.

Where possible the activities for coast protection on national and regional levels should be reconciled with integrated management plans for coast protection which:

- based upon detailed learning the littoral geomorphology and ecological processes;
- take into account relations among physical, ecological and economical categories;
- merge these categories in definite strategy for coastal zone development;
- are based upon sustainable and rational administrative and juridical backgrounds.

Before adopting the definite protective measures it's likely to carry out relevant research to determine basic ecological parameters that could be used for the evaluation of potential alternatives with measurable (potential or real) consequences. All options should be estimated and evaluated including those "to do nothing" from the point of view the control for risks and with the support of improved system of early warning, developing the ideology of existing line of defence by its renovation or adding sea deposits.

Certain designated areas require special consideration when determining coastal defence strategies. New coastal defence measures outside settlements should normally not be executed as they are of questionable economic value and impose negative impacts on the environment. In fact it is often both economically and environmentally beneficial for coastal areas outside settlements that have been subject to episodic flooding before they were dyked for land use purposes only, to be restored as coastal wetlands through the removal or relocation of dykes further inland.

In order to avoid shifting the burden of coastal defence from one area to another it is important that cliffs as sediment supplier and natural coastal flood areas as potential nutrient traps, should not be subject to any new coastal defence measures.

### *Techniques*

The managed retreat should be considered in order to preserve coastal ecosystems, such as saltmarshes. Where coastal defences are necessary the use of natural materials such as stones, sand, soil or wood is preferable to artificial materials such as concrete, asphalt or plastic as these may cause pollution upon disintegration. Soft engineering methods using natural materials are generally preferred over hard engineering methods as they typically have a lesser impact on the environment and better maintain the natural character of the coast.

Sediment for beach nourishment should contain only a minor silt content in order to reduce the turbidity of coastal waters during extraction and deposition thus maintaining coastal water standards. Where dredge sediments are used they must be tested for pollutants and should not be used if pollutant levels are detected. (See guidelines on sand extraction in industry section.) Beach nourishment should not be carried out annually; beach flora and fauna should be given ample time to recover.

Dune management techniques encourage the preservation of dune slack areas and a diverse dune flora by avoiding planting regimes which concentrate on marram or trees and allowing mobile sand areas to develop.

#### *Project construction*

The construction phase of any coastal defence scheme should be planned and carried out with special care and should include consideration of the:

- appropriate timing of works with regard to such factors as flowering and breeding seasons of plants and animals and to public usage of beaches;
- definition of work areas to avoid compaction and trampling of sensitive areas, particularly in upper shore areas such as saltmarshes or sand dunes.

#### *Post-project appraisal*

A post-project appraisal is a recommended practice as it encourages the mitigation of any reported and unforeseen environmental problems and aids in the improvement of the design and implementation of future schemes. Such appraisal should include:

- a monitoring programme which addresses the efficacy of the coastal defence works and the impact of the scheme on the environment;
- an environmental and engineering audit based on a comparison between the baseline survey and the monitoring programme, in order to identify any unforeseen effects;
- a maintenance programme.

## VI. Defence

### 6.1 Status and Trends

Historical development of the European continent stipulates the presence of powerful military-economic potential that has been formed in conditions of contradictions and implementation of military doctrines for different political systems and military-political blocks. Under these circumstances for the last decades a lot of military technique and armaments was accumulated in Central-Eastern region of Europe, including rocket-nuclear weapons for strategic balance with regular military forces. Scattered network of powerful enterprises, factories and organisation of defence domain was organised. As the rule every day military activities had extremely negative impact on environment.

Since 1989 there have been major changes for military defence activities in Europe, especially in Eastern Europe. Military activities were reduced there, a lot of military bases were closed and vast amount of the rockets with nuclear weapons was dismantled.

Nevertheless due to years-long violations of nature-conservation legislation, in particular for keeping and exploitation of air-forces and naval bases, polygons and tank-bases, training centres, bases and storage of fuel-lubricant materials, military-repair and construction enterprises, garages for military and auto-tractor techniques, military forest and agricultural enterprises, objects of heat and water-supplying, water purifying and discharging facilities, places for accumulation and utilisation of wastes as well due to breaching the requirement of ecological safety during military and naval training and manoeuvres contamination of main environment components: air, ground, surface and subterranean water have been persisted. Introducing in Ukraine the wide-scale military reform, conversion of defence industry, liquidating rocket-nuclear and chemical weapons, utilisation (deactivation) of obsolete military techniques and armaments, components of rocket's fuel and other toxic technical substances as well wastes of military property is conducted with the threats to environment in most of the cases.

### 6.2 Impacts

Military activities domain is based upon functioning numerous people communities, different technical meanings, using large amount of fuel-lubricant materials and special technical substances. Herewith dynamic and active interaction takes place between regular activities of military forces and environment components.

A broad spectrum of activities related to military defence has implication for coastal regions. These include, for instance:

- naval manoeuvres;
- harbours, military bases and training sites located in the coastal zone;
- disposal of arms and ammunition;
- presence of nuclear-powered submarines and weapons.

Military and defence requirements include:

- land possession and occupation;
- noise extenuation areas;
- restricted or protected zones for firing ranges, training areas or underwater explosions as well alternative shipping channels.

Military objects including parks (garages) for techniques, armoury, military settlements, provisional network and communications are potential sources of pollution for environment in the places of disposition, temporary activities and transportation. Maintaining the weapon ant techniques, every days exploitation of technical systems and vehicles, training and provision of living conditions for personal staff is accompanied with revealing wastes and damp of different substances.

Nature and composition of the wastes and damp revealed, methods for their decomposition and liquidation which are common for majority of military forces could be formulated in the groups:

- gaseous toxic substances (oxide of carbon, nitrogen, sulphur etc and high disperse carbon), to be born in the processes of fuel burning at heating stations, vehicle's engines, stationary or mobile installation;
- domestic and industrial waste waters, originating from barracks, houses and buildings, service amenities and repair stations for all types of techniques and revealing due to functioning house-holding and technological objects (buildings);
- solid wastes as result of functioning house-holding and technological objects (buildings);
- electro-magnetic fields and ionised emission (radio-active substances) originating from radio-technical equipment, locators and other devices;
- waste fuel-lubricant materials, loosen oil-products, used acids (electrolyte in accumulators), bases, other special solutions (for breaks, cooling liquids etc) ;
- organic and inorganic substances (wastes) and other domestic garbage which could have toxic influence or contain disease (pathogenic) bacteria.

Volume of gaseous outbreaks, amount of wastewater and solid wastes depends on the sources of its origin, type of armament and technical meanings, intensity of exploitation and number of personal military staff of depot (enterprise).

Generally military and defence activities lead to the same types of wastes that any other social-economic activity does. However the consequences in some cases could be much more disastrous since environmental law and rules do not limit military activities (there is a little - to be exact). Thus military and defence activity have led to serious ecological problems like destroying landscapes, pollution of soils, water and air, contamination of environment by radioactive substances.

Unfortunately, in most cases the information relevant to defence activity is for limited access taking into account national security interests and it is one of the fewest sectors where principle of open public access could not be introduced.

As far as military people always have advantages over other users in the domain of nature resource use, it's almost impossible to avoid the conflict situations in particular in emergency pollution and destroying environment. For instance, naval and air-force training have never been cancelled undermining their negative impact on environment in the result of low altitude flying or underwater bomb explosions. Therefore the sensitive nature of coastal zones is particular suffering from military activities in these sea areas.

High risks of storing the weapons also create large threats to the nature, in particular when the military objects are located near the vulnerable landscapes like shore lowlands and sand dunes. These are the regions that are the most sensitive and vulnerable to the consequences of people's activities and have slow rates of regeneration.

Improper organisation of conversion and reforming the military and defence activities especially in the cases of leaving former military places in favour of local or regional management also reveal large problems. Uncontrolled distribution of toxic and other dangerous substances from abandoned dumps is dangerous follow up of the process, carrying big threats to ecosystems and local population.

Threats to the environment consist also in the presence of large amount of chemical weapons having been disposed in seas in the end and after the Second World War. Very often the information on coordinates of dumped chemical weapons is absent or hidden when non-governmental organisations ask for it. As the result, fishermen are under high risk of "catching" rusting chemical weapons, which bring even more high danger to sea living organisms.

Some coastal regions allocated for military usage are situated near important territories for breeding places of those birds under the threat of extinction. These territories are often used for firing ranges, training areas and training flights of interceptors and helicopters causing tremendous deterioration of bird life-conditions. The threats are also arose for the migration routes of Afro-Euro-Asian migrating birds (Snake island, coastal plots of Odesa, Kherson, Zaporizhzhya oblast, Crimea peninsula).

### **6.3 Possibilities**

Despite of depicted negative consequences, the military bases and especially those, occupying large territories for training, have been often bringing out indispensable value to the nature. Such landscape plots could much differ of surrounded territories representing industry and elements of infrastructure.

For example the status of nature complexes within the seashore plots occupied and "protected" by military bases in the most cases has no external impact. Absence of any economic activities on the territories has helped to preserve important animal and plant habitats. For instance former military Opykskiy polygon after long-term usage was converted in 1998 into nature reserve where nowadays the indigenous nature complexes has almost restored. More and more such territories are withdrawn from military activities. In the cases new possibilities appears to convert them in continental or marine protected objects.

Ecological problems of conversion for the region, where recently military bases were located, are conducted with worships of economical and social nature. However there are a lot of possibilities for co-operation among local authorities in addressing the problem of environment protection and rational nature usage that in the same time facilitate the problem of local people employment. Since the expenditures for nature conservation programmes and activities require sufficient funding, it's necessary to set clear priorities and justify the problems for working out the realistic, effective and economically beneficial solutions which is acceptable for those countries having financial shortcoming for the programmes implementation.

Military forces should take into consideration the peculiarities of environment protection in the process of their regular activities and military training, to implement the activities targeted in mitigation and liquidation of the consequences of environment pollution in places of dislodging, military manoeuvres, fire-ranging and transportation.

### **6.4 Recommendation for military bodies conduct in coastal zones**

Priorities must be set for ecological police in military sphere and enterprises of military-industrial complexes as follow:

- ecologisation of military-technical policy of the state;
- developing ecological comprehension and nature-conservation legislative consciousness of military authorities, personal military staff, workers and employee of military-industrial complex;
- carrying out scientific research and scientific-technical engineering to evaluate, stabilise and improve the ecological status in the regions of military depots and objects allocation, including those of foreign county - Black Sea fleet of the Russian Federation;
- introducing the process of ecological certification of military objects, working out the system of ecological monitoring on the territory of military bases and enterprises following by including that into the system of state monitoring of environment;
- setting the obligatory juridical responsibility for violation of nature-protection legislation by military personnel, including those of foreign military that temporary dislodged on the territory of European countries and the personnel of defence enterprises;
- development and implementation of Wide-scale programme for securing ecologically safe activities of military forces in future.

The main activities for achieving the stable and guaranteed ecological safety in the process of military activities and conversion of military-industrial complex are to be streamlined on:

- formation of database for ecological status of the objects of defence sphere and possibilities for using conversion of military-industrial complex for mitigation of the harm to environment and improvement of ecological situation;
- developing and manufacturing modern samples of nature-conservation techniques and equipment for military forces;
- including defence branch objects to the single system of state ecological monitoring;
- rational nature usage, ecologically safe treating the territories, objects, lands, forests and water aquatoriums in military-training and military-industrial activities;
- liasing mutual believing, information and interaction among nature-conservation bodies and authorities of military forces on the issue of ecological status and nature-conservation activities in military domain;
- liquidation of the consequences of ecological harm caused by military-defence activities and, in particular, compensation of losses caused by temporary dislodging the foreign military forces on the country's territory;
- raising awareness and improving the level of objectiveness once spotlighting ecological problems of defence activities in mass-media.

Requirements of nature-conservation legislation, orders and directives of defence bodies should oblige commanders and supervisors of all level to implement the activities targeted on liquidation and preventing pollution of water-reservoirs, ground, atmosphere air, conservation of plant and animal world. Every day military activities and training must not harm the environment.

The main attention should be paid to introducing the same legislative acts for nature conservation and protection both for military activities and civil organisations.

Military authorities should take responsibility for environment pollution and harm caused to environment. Defence Ministries of European countries are developing the instructions

(recommendations) for environment management on military objects. They could help to avoid those problems.

Information on military activity consequences within sea coastal zone should be available for common people.

Military activity causing the harm to wild nature in nature reserves, national parks, other protected objects, located both in mainland and marine zones, must be prohibited by legislative acts. Reducing to minimal extent the military manoeuvres and training would help to increase deterioration of nature or intrusion in the territories that possess important shelters for rare species of flora and fauna and those under the threats of extinction.

Protection of nature should be undertaken in the process of implementation of their basic responsibilities and should include standard set of activities.

#### *Nature protection on (former) military bases*

Former military bases that have occupied valuable nature regions or regions of potential nature value could be converted in natural territories. Military authorities together with civil local (regional) authorities should take responsibility for cleaning the territories that will be withdrawn from military activities. It 's also important pending the process to provide wide range of stackholders with information about former usage of the territories namely:

- work out and make open the data on former activities with chemical weapons (compositions) including the data on its storing, using, damping, incinerating, burying as exclusively important ecological and medical information;
- provide with methodical guidelines the activities related to basic ecological surveillance for all the places of former army and naval activities with chemical weapons;
- provide with methodical guidelines to carry out the rehabilitation works in all the places of former activities with chemical weapons (compositions) on the territories to be withdrawn for economical turnover.

#### *Radioactive Waste Disposal*

The military and defensive plants, foundations and organizations, which use radioactive substances in the various forms on any purpose, are obliged to provide ecological safety in this field of activity. This should avoid any possibility of radioactive pollution of environment and whichever negative influence upon people health during production, enrichment, transportation, processing, using and disposal of radioactive substances.

Disposal of radioactive waste in the marine or coastal environment, where their influence can damage these environments, cannot be reasonable in any circumstances. Rather, it should be concentrated and contained, preferably on or near the site where it is generated, until safe, permanent disposal techniques are developed. The staff professional skills and tuition for improving of their proficiency in radioactive waste management should be considered as a matter of a primary importance.

In order to prevent possible complications it is necessary to elaborate well-defined plan of actions in case of an ecological accident. It should include, along with other actions, detecting and investigation of accidents, connected with badly pollution of environment, organization of operative control behind a zone of pollution, liquidation of its impact, and also pollution prevention.

The plan should provide the order of the immediate message being made by the plants, foundations and organizations (irrespective of subordination and property forms) to appropriate central and local authorities about ecological accident or dangerous situations, which had been formed, and measures, which had been taken. Also, the plan should provide submitting of the information to public about unfavorable ecological situations and about actions of population in such cases so that their staying on the polluted territories could be limited. The plan should provide ways for lowering pollution level and the procedure of all measures while dangerous ecological situations.

### *Waste Disposal*

Military authorities should take responsibility for handling wastes in an ecologically acceptable way, including the same cradle-to-cradle techniques gaining increasing attention by civil authorities.

Discharging (emission) of pollutants to the environment at military objects (from each source of pollution, in each sure case) should be conducted only after carrying out of tool measurements and appropriate investigations on the basis of special permission, that has to be given by regional departments of nature-protecting bodies in agreement with bodies of sanitary supervision.

The repair plants (organization) should have industrial, economy (including household) and rainfall drain as well as separate sewage treatment facilities for galvanic drains. Industrial waste (sewage), when discharging to the urban sewerage, have to be treated at local (own, industrial) treatment facilities to normative levels of concentration of pollutants. Technological sites and other sources of discharging equipped with closed technological systems should have strainer-ventilated dust/gas-clearing installations.

On the purpose of prevention of fresh water resources exhausting and pollution, military units (plants, organizations), that consume water for drinking and economy-household needs using technical ways of water obtaining directly from natural objects (underground waters, rivers, lakes and the other reservoirs), or discharge to aqueous objects the waste, should have appropriate water-using permission and to be subject of control on the part of regional nature-using departments in the field of observance of the water-using rules.

On the purpose of cutting discharges (emissions) of pollutants to environment in places of military dislocation should be provided constant improving of culture of maintenance of engineering (aggregates, installations, devices, technical systems), including following ways:

- organizations of complete gathering and following regeneration of every used lubricant materials, solvents of hydraulic and other liquids, various chemical reagents and their solvents, industrial waste (from galvanic, preservations, dyeing, washings etc.);
- maintenance in properly functioning of different shut-off and distributive accessories, containers for saving of mineral oil products, special kinds of fuel, toxic liquids and substances;
- Preventing of abnormal leakage cases, discharges (emissions) of pollutants due to both technical reasons and violation or inattentive execution of the responsibilities by the workers.

In coastal zones, including those along the marine gulfs and firths as well as on internal water Islands it is necessary to prohibit:

- application of fast and strong pesticides;
- arrangement of polygons for waste and sewage disposal;
- arrangement of cesspool for accumulation of household waste in size more than one cubic meter for 24 hours;
- arrangement of fields for filtering and creation of other sewage treatment structures.

It is necessary to strictly prohibit any junking of luminescent (mercury) lamps to scrap-heap.

*Arms, Ammunition, Military Engineering: Disposal at Sea*

It is necessary to have reliable strategy of cleaning up of seas of arms, ammunition and military engineering, which were buried before there. Information on the past disposal of arms and ammunitions at sea by the military should be obtained. Separate military authorities should establish and/or co-operate with efforts designed to collect and safely re-dispose of such waste.

## VII. ENERGY

### 7.1 Status and Trends

The most prevalent fuels used in Ukraine are processed oil and coal. The rate of reduction in the use of nuclear power has slowed. There are around 5 nuclear power plants operating in Ukraine, which are located dominantly near rivers. Over the long term, an increase in the use of renewable energy sources looks very promising economically as well as environmentally. According to one recent study, a wide range of new renewable energy technologies will become fully competitive with conventional sources of energy during the next several decades. However, conventional sources of energy will continue to be exploited as renewables gain momentum.

### 7.2 Impacts

Mining and drilling, power generation, and the transport of oil and gas all have major impacts on environmental quality.

Specific impacts of conventional energy production include water pollution (oil, thermal, radioactive discharges), air pollution (CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>), land subsidence, and damage to habitats through the construction of access roads, use of heavy equipment, drilling and mining, all of which are harmful to biodiversity and landscapes in coastal regions. More serious damage may occur from accidents such as blowouts (oil and gas drilling), oil tanker accidents, or nuclear catastrophes. Conventional energy installations also occupy significant space in land-scarce coastal areas. The nuclear industry poses a special threat to coastal and marine ecosystems. Global climate change also represents a major threat to coastal and marine regions over the long term. The most prevalent greenhouse gas is carbon dioxide (CO<sub>2</sub>), with emissions arising from both natural and man-made sources. Of man-made sources, the burning of fossil fuels is the greatest source of emissions.

For these reasons, the development of renewable energy sources is preferable to continued investment in conventional energy supplies. However, renewables are not without their impacts, particularly at the local level, and it is essential that prior to development, environmental impact assessments must be carried out. It must be stressed, however, that in comparison with conventional energy sources, these impacts are small (with the exception of large-scale hydropower schemes).

Of all renewable energy sources, wind power is considered to be the most economically feasible for further development. Wind power may be generated by a single turbine, or by a group of turbines which together form a wind farm. The environmental impacts of a wind farm are greater than those arising from a single turbine. Wind farms tend to require large amounts of land, dictated by the needs for a minimum space between each turbine. Turbines need to be connected by roads, which can alter local hydrology. Bird and insect mortality may result from collision with turbines or electrocution by power lines, particularly when located along migration routes. Wind farms also have aesthetic impacts and there is often concern about noise disturbance.

Using of sun energy is also reasonable for coastal zone of Black and Azov seas. As showed the experiments at solar power station carried out in Crimea, such structures create the negative for the people and animals phenomena of a local level, liquidation of which is not ever possible.

## 7.3 Opportunities

Renewable energy sources, by reducing our reliance on non-renewable energy supplies (such as oil and gas which contribute to global climate change and air pollution) and avoiding the need to use nuclear power, contribute to a more sustainable and environmentally friendly means of energy production. The bioenergy production of biofuels (biomass) is also possible, particularly where land has been removed from cultivation. This would create new opportunities for rural employment and help counter the trend towards increasing urbanization. Finally, renewable energy sources provide a safer alternative to nuclear power, avoiding the need for the use, storage, transport, and/or disposal of dangerous radioactive materials.

Important opportunities to develop specific renewable energy sources include:

- Solar: Solar-generated heating is particularly attractive in the sunnier regions (Crimea, Azov region).
- Wind: Warm coastal areas may provide ideal conditions for generating wind power due to high wind speeds at low altitudes with low turbulence and because seasonal and daily wind patterns in coastal areas often coincide with the demand for electricity.
- Wave: Onshore facilities are probably most useful on a small-scale in remote coastal areas. Offshore installations are not economically feasible at present.
- Anaerobic digestion (sewage) for electricity generation: Sewage digestors are generally most viable in large urban sewage plants and are the most benefitfull.
- Bio-fuels: Set-aside agricultural land is an ideal location for producing biomass for fuel.
- Landfill gas: The exploitation of landfills for electricity generation is especially effective in large cities.

## 7.4 Guidelines for Energy Development in Coastal Areas

### *Energy Conservation*

In order to decrease carbon dioxide emission, there should be developed some programs for energy saving by rational energy using and waste treatment. Before considering the construction of new energy facilities, all opportunities to save energy through conservation and efficiency programmes should be exploited.

### *Air Pollution*

Any projects concerning construction of new power plants should be analyzed for their potential influence the world warming process and the air pollution problems. The topicality of pollution problem would be reduced if new plants run on the cleanest possible fuels (natural gas, renewables), while those running on dirty fuels (nuclear, coal, lignite, oil-shale and oil) should be phased out.

The strictest emission standards for **NO<sub>x</sub>**, **SO<sub>2</sub>**, **CO<sub>2</sub>** and methane should be applied to all plants throughout Europe so that pollution could be reduced.

### *Siting of Building and Infrastructure*

Guidelines on the Siting of Building and Infrastructure can be found in Urbanization.

## **7.4.1 Conventional Energy Sources**

### *Offshore oil and gas development*

There are many arguments in favour of a ban on exploration for new sources of oil and gas, for reasons of climate change or to protect ecologically sensitive areas. At a minimum, stringent environmental impact assessments should be carried out prior to any new development, and application of the precautionary principle would dictate that offshore activities should not proceed if it cannot be shown that they will not cause significant harm to coastal and marine ecosystems. All of these arguments should be thoroughly considered before deciding to open new areas for exploration and/or development.

With regard to existing operations, the industry should establish and implement integrated Environmental Management Systems.

Drilling muds and cuttings, particularly those which are oil-based, and polluted production water should not be discharged to the sea. Diesel oil-based muds should not be used anymore.

Possibilities for alternate using of marine oil- and gas-extractive platforms are to investigate.

### *Onshore Oil and Gas Exploration and Development*

Techniques such as deviated and horizontal drilling should be used to avoid impacts on sensitive natural areas.

Steps should be taken to prevent siltation from run-off waters, pollution from discharges and drilling muds.

As with offshore oil and gas development, oil spills should be anticipated and an effective contingency plan should be put into place.

### *Nuclear power*

This area of a power generating still has many unsolved problems. Operating nuclear power plants represent a very serious threat for environments. That is why the construction of Crimean powering plant, located in a coastal zone of Azov Sea, was stopped in the previous period. The alternative to such solution has not been found yet.

### *Radioactive Waste Disposal*

Radioactive waste should not be disposed of in the marine or coastal environment, or where it may otherwise affect these environments. Rather, it should be concentrated and contained, preferably on or near the site where it is generated, until safe, permanent disposal techniques are developed.

## **7.4.2 Renewable Sources**

### *Wind*

Wind power should be developed where possible alongside or within existing coastal developments (e.g. industrial sites, power stations, harbours) or on agricultural lands (and set-aside agricultural lands), set back from the coastline.

Wind farms should not be located in sensitive wildlife habitats or near residential areas.

Once wind turbines have been installed, local authorities should ensure their protection, e.g. from the construction of buildings or other tall structures in the surrounding area which could reduce local wind speeds.

In especially sensitive areas, machines designed for noise reduction should be employed. For example, turbines with two-speed operation allow the use of the lower speed during quieter periods of low wind, and the higher speed during noisier periods of high wind. It is essential to ensure proper maintenance of these machines.

### *Hydroelectric Power*

New hydroelectric power stations could cause an erosion of coast due to reduction in sediment supply. Therefore, hydroelectric power stations should not be located in sensitive areas, particularly virgin river systems in coastal drainage areas. All new or existing hydroelectric dams should be equipped with fish ladders to allow migrating fish to pass. Such fish passes must remain operable even when river flow is low. All turbine intakes and outfalls should be screened to exclude fish.

### *Biomass*

Biomass plantations are less vulnerable than natural ecosystems. Therefore, they should only be established on degraded or set-aside agricultural lands. Equal amounts of set-aside land should preferably be allowed to return to a natural state in order to promote biodiversity.

## VIII FISHERIES AND AQUACULTURE

### 8.1 Status and Trends

Coastal waters serve as important nursery, feeding and spawning areas for the world's fisheries, and much of the global marine fish catch comes from important habitats in nearshore waters, inter-tidal areas, estuaries and bays.

The supporting of fishery, fish resources restoration and hydrobionts cultivation for commercial objectives are important activities in the system of constant coastal zones development of Ukraine.

Until recently high productive Black and Azov seas gave Ukraine 150-180 thousand tons of fish and marine products annually. Nowadays this amount has decreased three times.

Recent environmental changes of the seas (as results of taking away a part of river drain, ocean pollution and decreasing of its transparency, violation of the fishery rules) have resulted in sharp reduction of their bio-productivity. In particular it affected Azov sea, fish-productivity of which has decreased ten-aliquot.

Introduction of aliens' species caused serious impact to Black and Azov seas biodiversity. The number of hydro-bionts reduced, and fishes catches decreased after introduction of Atlantic alien species: jelly-fish, that is the competitor of local hydrobionts. The fish resources' cutting has led also to decreasing of employment opportunities in coastal zones.

There are fish-lakes and fish-pond functioning in coastal zone. In estuary zones there are operating plants for sturgeon white-bait cultivation. The tendency concerning development of marine farming and shellfish cultivation is being formed

### 8.2 Impacts

As long as effective control of fish resources fishery regulation is absent, there is observed an excessive catch practically of all marketable fish species. Besides, the negative consequences for fishery is stipulated by biotopes destruction, application of inappropriate fishing ways, random catch of no-purpose species, ocean pollution with organic waste being the cause of oxygen-free zones occurrence and destruction of bentic bio-cenosis. The special kind of serious ocean pollution and ruining of a marine bottom surface is the bottom substrate (slime) moving for construction of marine navigable channels.

Disposal (discharging) of fertilizers oddments to the sea (as well as herbicides, pesticides and other chemical substances) predetermine the negative influence population of some species of marine fishes.

There is a threat of genetic transplanted of new attribute of cultivated hydro-bionts to wild species.

The development of coastal tourism rather creates obstacles for habitats safety of coastal species of plants and animals. Active rest, sporting fishery, mini-fleet are not always compatible to aquaculture industry.

### **8.3 Opportunities**

As for now FAO undertook the development of international and national the normative-legal acts concerning the fishery conducting responsibility. The worldwide Code of Conduct for Responsible Fisheries, that directly concerns all fishery facilities, was elaborated.

The Code is directed toward "members and non-members of FAO, fishing entities, subregional, regional and global organizations, whether governmental or non-governmental, and all persons concerned with the conservation of fishery resources and management and development of fisheries, such as fishers, those engaged in processing and marketing offish and fishery products and other users of the aquatic environment in relation to fisheries.

The Code is broad in scope, covering fisheries management and operations, aquaculture, integration of fisheries into coastal area management, post-harvest practices and trade, and fisheries research. Its measures relate not only to technical issues, but also to social issues such as the fair and equitable treatment of fish-workers. If it is widely implemented, the Code would represent a major step forward in the conservation of marine biodiversity.

### **8.4 Leading Guidelines for Fisheries and Aquaculture**

The FAO Code of Conduct for Responsible Fisheries, particularly Article 10 on the Integration of Fisheries into Coastal Area Management, should be implemented by all coastal states and fishing communities. The UN Agreement for Straddling Fish Stocks and Highly Migratory Fish Stocks (4 August 1995) should also be implemented as quickly as possible.

Fisheries management should adopt a precautionary approach in which the fundamental health of coastal and marine ecosystems is maintained. A lack of adequate data should not be considered grounds for postponing effective conservation measures. The optimum sustainable yield should be considered as a replacement for the minimum sustainable yield of any given fishery.

Wherever possible, capture methods which seriously damage or degrade coastal and marine ecosystems should be phased out, with priority given to environmentally safe fishing methods.

The development and use of increasingly selective fishing gear and methods should be encouraged for both target and non-target species. By-catch should be returned to the sea alive and in a healthy condition. It is necessary also to avoid and reduce to maximum pollution from catches. Large-scale pelagic driftnet fishing should be ceased in accordance with the UN Resolution on this subject.

For stocks which are currently over-exploited, particularly where spawning stocks are depleted or where the ecosystem has been seriously damaged, fishing efforts should be reduced or ceased until stocks have recovered

Development of fishery should be allowed only within those limits and with using of such technologies, which do not harm coastal zones environment. Integrated ecosystems cultivation, for example simultaneous cultivation of diverse species of seaweed together with shellfish and sturgeon, would be more effective and rational than cultivation of monocultures.

To save biodiversity it is necessary to prevent any infiltration into the marine environment of cultivated species of fish and other hydrobionts, which do not live in the given ecosystem.

As incubation stations require the large areas and water resources, the placement of marine incubators would be preferable in the developed areas of coastal zones, where are already certain roads. Thus, just there they would be most ecologically safe. If it is possible, placing them are expedient in already existing constructions.

Infiltration synthetically cultivated species of fishes or other marine species to marine environment must not be admitted. In any case nurseries and incubators should be allocated on maximal distance from plantations of marine seaweed or other sensitive and vulnerable habitats, including reserved and fish places.

Hardware for fish cultivation and feeding, as well as installations for processing, freezing and preservation of marine products, irrespective to their sizes and productivity, should be placed in the developed areas of a coast, which have already certain roads. The containers for fish cultivation should be earthed up and all the pipelines should be under ground.

The access of birds or wild species of fishes to nurseries and incubators should be blocked with nets.

It is necessary to avoid any infiltration of cultivated or any other marine species to marine environment. Each certain nursery or incubator should have elaborated emergency plan for preventing of considerable infiltration of cultivated species to the natural environment.

In order to provide minimization of impacts from addition to certain ecosystem of ectogenic species the measures of biological safety may be developed.

For this purposes it is possible to use the results of the previous similar impacts analyses and implementation of quarantine. Also, if necessary or expediency, it may be applied some measures for eradication and destruction of "alien" species, or even for stopping production. International Council on marine resources using and the Code of introduction and transferring of marine organisms (1994) offer important precepts and guidelines upon this theme.

Application of the pesticides, control of diseases and vermin as well as preventive measures against those should be thoroughly investigated. These concern vaccination, grafting, dietary, disinfecting of any transport and technical equipment, using of carpets for legs disinfection, regular health control, maintenance of optimal populations density, good care and providing calm (still) conditions for fishes. A sick fish should be treated or casted out but never got to marine environment. A dead fish should be removed and safely deleted.

The fish farms can reduce discharging or losses of nutritious substances to a minimum by using progressive technologies of cultivation (using a dry forage is preferable).

Special treatment installations may be used for disposal of solid waste, pharmaceutical and chemical drugs rests, fodder additives and other waste. The places of wastewater discharging should be located at maximal distance of water-pumping places, which pump water for other technological processes. Waste water after fish cultivation may be used agricultural irrigation.

Using of poisoning chemicals on fish farms should be severely prohibited.

## **IX. Forest management**

### **9.1 Status and Trends**

Only in North European countries the forests are considered as an important economical factor of coastal strips. Despite their small economical advantage through the influence on the growing of trees of marine climate, the forests were renovated artificially in order to stabilize sand dunes, attract tourists and avoid the ground erosion. This situation considerably reduced the attention to coastal forests as a source of wood raw materials. At the same time these forests are very valuable from the point of view of recreation and as an object of ecological tourism. The forests of the South Coast of Crimea are the most important in this respect.

### **9.2 Consequences**

The availability of natural forests has exclusively great positive importance. Its influence on the environment, including sea coastal strips, maybe considered as an ecologically stabilizing one. The forests as a natural phenomenon, can guarantee a very important function of protection of typical, rare, disappearing species and groups of plants and animals, as well as those ones which are under the threat of annihilation. They are also a natural absorbers of coal dioxide and such a way reduce the penetration of this gas into the atmosphere. The influence of some components, especially the elements of contamination, on the staying of forests and their ecological systems is much more bigger than possible negative influence of forests on another ecological systems. For example, the intensive forest cultivation may have a very negative influence on the water systems and especially on the coastal ones. The imperfection of technologies of forest cultivation may lead to the penetration of pesticides, fertilizers, etc. into the coastal waters.

The cultivation of single-crop systems makes the biological variety of the forest poorer. The afforestation which consist of non-typical tree species (in particularly for coast protection) are available in the coastal dunes and violate the natural dynamics of development of coastal ecological systems. The dune vegetation which suffered from excessive land using or cattle pasture, become degraded from wind erosion. As a consequence of this process the sands begin to “travel” to the people’s dwellings or arable land. Therefore the dunes afforestation was effecting by mean of pine-tree cultivation. This practice takes place even now. The most considerable ecological consequence of sea coastal strips afforestation is a losing of their vegetation and reducing of the ground waters level. The forest-plantation, especially in the coastal low-lying lands, make influence on landscapes too.

The forest fires are the main threat for the coastal forests of Crimea as well as for all coastal environment. Because of low efficiency and poor using of economical possibilities of the coastal forests the local population doesn’t involved into the problems of their protection. The forest fires lead to another consequences such as: the violation of ecological systems, impoverishing and threat of annihilation of the local biological variety, especially the vegetation, appearance of non-typical species and groups of plants. In many cases the forest fires favour the excessive development of erosion which leads to the losing of the most valuable for the organisms stratum.

### **9.3 Possibilities**

The coastal forests are to be as a reserves, especially on the coast of Crimea where they create a very agreeable and fresh atmosphere for relaxation. If to unite the reserves with cultivation of local tree species, it may favour the expansion of natural territories in some coastal regions where they were annihilated at one time. All the efforts are to be directed not only to the protection and renovation of natural and seminatural coastal forests but to the creating of the bigger variety of the forests or their vegetation groups as well.

#### **9.4 Main recommendations concerning forestry conducting at sea coastal strips**

Plans of afforestation which are based on the local conditions and are realized according to the means of integrated control of the sea coastal strips, are able to improve considerably the ecological immunity of the environment. The coastal afforestation are to be planned and used properly and this is to guarantee the protection of wild nature and its environment including the protection of water, ground and natural processes which take place in the ecological systems. The landscapes where the forest lots and other natural, cultural and historically valuable objects are available, are to be protected too.

The exceptionally valuable local forests are to be protected from the negative influence of various exterior factors as much as possible. The control of natural cycles of the forest ecological systems development can help to optimize their positive influence on the stability of the humidity regimes of atmosphere, temperature and wind speed. The constant vegetation of industrial forest zones is to be kept up by mean of selective weeding out, i.e. group removal of non-desirable ones or by mean of planting some more necessary plants in the process of regeneration. The ability to adaptation of the components of the forest ecological systems to the wide range of threats from the side of their surrounding and people's activity as well, maybe increased by mean of reproduction of the trees which are adapted to the local conditions and by mean of development of various forest plantation and systems of their cultivating. It is necessary to avoid to use the pesticides and nitric fertilizers in the forests and near them. If this avoiding is impossible, then it is necessary to guarantee the means which could prevent the penetration of nitrogen and other contamination elements into the environment.

The annihilation of the trees in the limits of coastal strips is to be prohibited. The full cutting down of the forests is to be prohibited too. If the cutting down takes place not at the coast as such but in the border with it, then the damage for the forest ecological systems is to be minimized and this maybe reached by mean of using of ecologically safe mechanisms and technologies.

The areas of the overmoisten regions are to be expanded as much as possible. These areas are not to be dried out in order to plant there new forests. In case of drying out for drain works effecting, the ponds for the water settling and humus accumulation are to be created.

In order to compensate the natural acidulating of the forests where it is possible and appropriately, the leaf-bearing trees may be planted instead of conifer ones.

The considerable part of the dying out trees and those trees which fell down from the tree circle to the surface are to be left in the forest for further development and replenishment of the populations of birds, mammals, insects, mushrooms as well as the species which are under the threat of dying out.

The forest fires may be both destroying and creative. The prevention of fires as well as forests protection, including fire obstacles, mineralized strips, etc. are to be a part of the plan which determines the appropriate control of the coastal forest.

## **X. Industry**

### **10.1 Status and Trends for development**

The part of coastal strips of the seas of Ukraine are possessed by industrial zones. The most economically developed ones are coastal areas which gravitate towards the biggest trading ports as follows: Illyichevsk-Odesa-Pivdenny, Mikolayiv, Kherson, Sevastopol, Feodosia, Kerch, Berdyansk and Mariupol.

Economical zones are based on Kamishburunsk deposit of iron-ore and salt deposit of Krasnoperekopsk and Saki. The outfalls of great rivers are practically free of industrial buildings (excepting Pivdenny Bug).

In the regions where the heavy industry prevail, we can see the ceasing of development or reducing of the production volume. The highly technological enterprises may be considered as an exception.

There are some signs which could confirm that in future the industry development may be stabilized but unprobably that the production capacities of these enterprises could back to the past high level.

It is hard to foresee now how these tendencies will make the influence on sea coastal strips because this considerably will depend of the future tendencies of transport routes development, especially of their mutual communication with sea ports and industrial centres which are in the heart of continental zone.

Obviously, the coastal industry should reduce its negative influence on the environment. Those shperes of industry which reached a certain success in this direction, testify that technologies improving together with production diversification gave positive economical results.

### **10.2 Consequences**

The level of industrial production considerably depends of the water availability, and in many countries of the world just the industry is a main consumer of water resources.

Feeble location of industrial enterprises in the extremely sensible zones lead to the destroying of coastal wetlands together with their natural inhabitants.

Industrial discharge of dangerous components to the coastal waters may have “vitally” or “half-vitally” important consequences for animals and the people as well. Even if the enterprises like these are in the heart of the continent, they could make the considerable influence on coastal zone. When the rivers or coastal area of water are used for discharge of industrial wastes into them, then the results of such an actions expand their dangerous consequences very far down-stream.

Both the lands which are used under production needs, fuel delivery, conservation/accumulation and wastes discharge, and surrounding territories (grounds, sweet water and the sea) degraded of pollution, are, as a rule, unfit for any further using. The construction of industrial objects makes a considerable damage to surrounding landscapes where such a construction takes place, and breaks a visual aesthetics of these landscapes.

Extraction of sand and detritus needed for industrial construction, beaches replenishment, navigation routes cleaning and making gulfs deeper, may lead to damage of coastal ecosystems. Excavation and digging make a very big damage in shallow zone and approximating to the coastal one, provoke the change of dynamics of precipitation carrying over and so, provoke the process of erosion.

The dumps of grounds in the sea, exceeding of excavation over the embankment or vice versa may smother the flora and fauna, change local hydrological regime and become a source of discharge of toxic elements into the sea.

There is the apprehension that the accumulation of the silts may be used in order to get round the prohibition of discharge of wastes into the sea. Taking into consideration all this, the sides who signed London Convention are to favour the actions which could prevent such a practice. But by a certain circumstances the silts using, for example, for sea beaches replenishment or for nature landscape renovation, may have a positive result for coastal ecosystems as well. In this case, it is very important the silts to be cleaned from any pollution.

### **10.3 Possibilities**

Every time industrial enterprises reach more and more improved development by mean of using the clean production technologies which are elaborating in the stage of projecting and improving in the process of production. Despite that considerable progress in so called technologies “from cradle into coffin” was reached (i.e. maximal utilization of raw materials and wastes and their burial), but now more and more attention is given to the more progressive technology “from cradle into cradle” (wastes free production). It means that the process of production must stipulate the re-using and recycling of raw materials and wastes. And only some components may be added to the process or be dressed if it is necessary. This form of wastes minimization has a great positive importance for coastal sea strips ecosystems existence and it is economically advantageous and prevent the pollution of the environment.

### **10.4 Guidelines for industry development in coastal strips**

Industrial objects which work in coastal zone are to be responsible in respect of any damage caused to the environment . In these cases the possibilities and potential of using of clean production technologies and processes are to be carefully examined. And a special attention is to be paid just to the contamination and negative consequences in this or that region.

*How to choose appropriate lots for industrial construction and infrastructure*

Main recommendations concerning this topic you can see in the work “Urbanization”.

*Energy saving and pollution of air*

Within all the process of production cycle the industrial enterprises have to reduce the power-consuming of their technological processes and energetical resources saving (beginning from the stage of projecting and constructing of the industrial object and corresponding programs elaboration, including the output of ready production and using and utilization of wastes). The non-used production is to be recalled but the components of this production are to be re-used or done over again for their maximal utilization.

New industrial enterprises are to be projected thus to make possible the using of the most clean fuel. The most severe demands concerning the norms of discharge of hotbed gases and such a components as NO<sub>2</sub>, SO<sub>2</sub>, CO<sub>2</sub> and metan out are to be drawn up.

### *Direct discharge*

The Governments of European countries have already admitted the necessity of the struggle against continental resource of contamination of the sea environment, and undertook to fulfil appropriate means in zones of the Nothern, Baltic, Black and Mediterranean Seas. In particularly, the discharge of dangerous toxic elements (in this case they are considered as a toxic elements which are able to be conservated for a long time and accumulated in the biological objects, including endocrine contamination) are to be stopped immediately. The bodies of management of industrial objects which are located at coastal strips must take into consideration these obligations as well as to develop the principle “from cradle to cradle” whilst new objects projecting, and this is to stipulate them to use clean technologies and production processes, the change of ecologically dangerous components for not dangerous and realization of the closed production cycles where it is possible. All these factors taken together could be an obstacle for the penetration of the elements of contamination into the environment. The main important task is as follows: immediate stopping of the production and using of organ-galogenic elements.

No new licences or permissions for dangerous elements discharge are to be drawn up. All the existent licences an permissions are to be canceled in order all the obligations mentioned above to be fulfilled. No new dangerous elements of contamination will penetrate into the environment.

The corresponding collectors and installations for sewage (out of coastal areas) are to be used as a mediate mean for dangerous pollutions discharge and their safe conservation.

### *Excavation and alleviation of sand and detritus*

Excavation of sand and detritus may be effected only in those coastal waters and in those depths where such a work will not make a damage to the natural processes (for example, lower of the level of so called active profile of sea coastal strip) are to be done never in the ecologically sensible coastal areas. Such a depths may be “comfortable” for the natural hollowing out by sea waves, storms or flows and ebbs as well, and they may be penetrated just by these flows down-stream. Very often this phenomenon is not taking into account but it is very important for coastal areas which staying and development depends of shelters of sea origin.

Excavation of the sea silts is to be planned in advance in order to avoid the breaking of seasonal natural processes such as fishing or birds migration.

Turbulence of coastal waters are to be reduced till the minimum by mean of using the most modern technologies and equipment.

Excavation of silts (sand and detritus) is to be as “dry” as possible, and rate and scale of works are to be optimized such a way the environment calmness is not to be broken. When small and small-dispersion admixtures are found out in precipitation composition, it is necessary to use a special equipment which would keep these admixtures. Zones of

excavation are to be limited in order to make future renovation quicker, i.e. to be settled by natural inhabitants. It is necessary to avoid full excavation of the sea sediments.

Much attention is to be given to rationalization of excavation works in the regions where the navigation channels and bays are available. It is necessary to see to the quantity of dangerous and harmful pollution elements which are available there in silts. These silts are not to be penetrated into the sea, and it is prohibited to use them for beaches replenishment.

### *Industrial limits*

The possibility of re-circulation of polluted water and sewage for another technological processes (agricultural irrigation, fertilizers, etc.) means that further penetration of industrial sewage into the communal net of cleaning stations is to be stopped immediately.

In those places where the systems of industrial technologies of closed cycle processes don't work either, the pollution of the environment and its degradation will continue until all the wastes before their discharge, be cleaned from nitrogenic and phosphoric compounds.

## **XI. Tourism, Recreation and Leisure**

### **11.1 Status and Trends**

The tourism industry is one of the most dynamic spheres of world economy, it is a very important item of benefit and economical development of many countries of the world.

According to data of the World Touristic Organization (WTO), 6% of world gross output is a tourism as a part of economy.

According to prognostication of WTO, it is expected a stable increasing in the sphere of tourism volumes about 4% per year as well as further increasing of its appreciable importance in creation of the world gross output within 11-12%.

Ukraine as a country with transitional economy, sets as an object to reach the profitability and competitiveness of tourism as an important sphere of its economy.

In the meantime the profits from tourism in the country's economy are not considerable. The receipts from tourism activity are around 1,13% in national gross output. In general volume of the world tourism benefits the share of Ukraine is only 0,13%.

But last time we can see in Ukraine the trend to increasing of the number of foreign tourists (from 1,5mln. 1995, 2,1 mln. in 1996 and 2,6 mln in 1997) and national ones (from 4,5 mln. in 1995, 4,6mln. in 1996 and 5,0 mln. in 1997).

Modern trends indicate that tourists are becoming increasingly interested in higher quality tourism experiences with particular interest in cultural, historic and natural sites and landscapes. Ukraine possess a unique possibility to satisfy all just mentioned demands and develop the sphere of tourism.

### **11.2 Consequences**

The program for tourism development in Ukraine should to take into account all the possible negative ecological consequences which could take place because of expansion of scale of tourism activity. It is acknowledged fact that unbalance of increasing of tourism volumes and possibilities of ecologically safe using of natural resources make a non-desirable influence both on the environment and social and cultural spheres of settlements. As a consequence of this, the phenomena as follows take place there: degradation of natural landscapes, losing of their recreational attractiveness, development of erosion and area displacement in coastal zones, etc.; economical problems which were not stipulated before are arising too: necessity of extra financing of the means which are aimed at nature protection; financial maintenance of the working people when the profitability of tourism objects is reduced will be also required; finding of money means for reconstruction and investments for the new objects of tourism.

Sea coastal strip is an area where complex infrastructure is forming, among them - settlements, industrial objects, engineer-transport systems, touristic and recreational objects, etc. which work in close intercommunication.

Degradation of environment under the influence of excessive development of tourism may lead to the destroying of the tourism industry as well as to the weakening another spheres of national economy. These problems are to be resolved in complex within strategic long-term plans.

### *Infrastructure*

The net of recreational and tourism objects (total capacity is over 300,000 places) are created in Prichornomorsky region of Ukraine (Autonomous Republic of Crimea and Mikolayiv, Odesa and Kherson regions). Main part of them are located at coastal strip of the Black Sea.

Governmental regulation of coastal building (special Governmental Decrees, official normative acts, etc.) favoured rational using and protection of recreational territories of coastal strip: health improving centres, pensions, hotels, etc. mainly with limited number of storeys; location of these facilities with taking into account optimal compactness of building; creating of “landscape pauses”, parks, forest like parks, etc.; limited loading of beach zones by mean of appointing in accordance with norms of simultaneous visiting. This could make possible to avoid destroying ecological consequences from tourism activity.

Together with this, the creation of engineering infrastructure for protection from erosion and coastal strip deplacing, was found out as a non-safe. Especially buns construction along the sea coast.

Due to this, it is seen the degradation of some populations of hydrobionts, develop trophic files (medusas, etc.), the structure of ground biocoenosis is changing.

The pollution of sea defined waters due to imperfect system of cleaning facilities such as: rain canalization, increasing of capacity of mineral fertilizers, chemical weed-killers and pest-killers, oil products in sea waters, grounds of non-utilized wastes and general sanitary staying of the area also make their negative influence on the quality of environment in coastal recreational zones.

The lack of sweet water resources at the sea coast, especially in summer, is considered as a factor of ecological danger.

Thus, the development of tourism objects is to be examined in limits of general context of unite infrastructure forming - a complex of facilities and communications which guarantee the working of all town-planning system of the seaside.

### *Health improving and recreation*

Health improving, recreation and tourism have a lot of common features (despite that some differences are also available) concerning the using of natural and cultural resources, service facilities, engineering and transport infrastructure, etc. Therefore in limits of sea coastal strip of Prichornomorsky region of Ukraine we can see a lot of recreational and tourism facilities (sanatoriums, boarding houses, touristic bases, etc.) with their sleeping buildings, dining-halls and restaurants, service facilities and hotel complexes; sportive grounds (for badminton, volleyball, tennis) and dancing, places for rest and climate curing are also properly equipped. Practically each object possess its own lot in the beach with proper equipment (solarium, aerarium, firs-aid post, etc.).

Building and appointing of these objects is effecting in Ukraine according to official norms (“Instruction for resorts and recreational zones planning and building. BCH 23-75”) which makes possible to reach a certain architectural order and conservation of ecological balance at coastal strip.

Nowadays when new social economic conditions such as property privatization, commercialization of service, taxes collection means are valid, both positive (increasing of tourism service standard towards world demands) and negative (non-regulating urbanization of coast) changes could take place there.

### **11.3 Possibilities**

#### *Protection of nature*

In order to avoid the processes of erosion and coast deplating, to make the beach areas protection and prevent the pollution of natural complexes from anthropogenic and technogenic loadings, special norms of “Water Codex of Ukraine” are valid now. They regulate the creation of water protection zones along the sea coast where we can see the land lots predestinated for coastal protection strips. On the territory of coastal protection strip which is to be no less than 2 km from cutting off the water, the activity which is a reason of pollution of this area (pesticides using, organising of waste grounds, etc.) is to be prohibited. Coastal protection strip is to be used only for construction of health improving, recreational and tourism facilities, creation of parks and organising of forest-like-parks, construction of facilities for engineering protection of the territory. According to Governmental Construction Norms of Ukraine (“Town planning and building of towns and villages” ), sea coastal strip, beaches and adjoining territories which width is to be no less than 100m from water cutting off, are to be carefully protected.

These means have positive consequences for conservation of natural variety and attractiveness of landscapes, historical and cultural sites of the coastal territory, and this stipulate tourism development.

In order to favour the best resolving of tourism development problems in Prichornomorsky region, it was elaborated international report with propositions concerning projects “Black Sea Sustainable Tourism Initiative (GEF-PCU, 1996)”. The preparation of it was fulfilled by specialists of 6 countries - Bulgaria, Georgia, Romania, Russia, Turkey and Ukraine with participation and financial support of world organizations.

Further elaboration of a new programmes for tourism development in conditions of Ukraine is also required. In particularly, wanted a program which would be similar to that one realized by nature protection company “European Blue Flag” for to guarantee a strong control of beaches and coastal strips protection.

### **11.4 Possibilities**

#### *Tourism development*

Further development of tourism industry in Prichornomorsky region of Ukraine should foresee the items as follows:

- to guarantee such a scales of development and form of tourism activity which would not breake optimal conditions of conservation and protection of nature variety and historical and cultural sites;
- reconstruction of existing facilities and building of a new ones which would meet world standards of tourism service;

- to resolve the problem of employment owing to new working places both in the sphere of tourism and in the objects of attendant spheres of national economy (production of ecologically clean farming products, handicraft industry, etc.);
- creation of prerequisites for ecological tourism development, expansion of the net of reserve fund objects in coastal strip, in particularly, national nature parks and regional landscape parks.

Realization of these means is to be based on the elaboration of documentation forms adopted in Ukraine, i.e. regional (district) schemes of perspective tourism development, general plans of resorts, recreational zones, business-plans of some facilities, etc.

All the new project documents are to be based on decisions of projects of district planning of seaside regions (Southern Coast of Crimea, Western one, etc.) where the zones of different function purposes are determined (balneological resorts, climate resorts, resorts of mass short-term rest, etc.).

#### *The choice of lots for industrial building and infrastructure*

Guidelines for the choice of lots for industrial building and infrastructure creation are done in the article “Urbanization”.

#### *Projecting and planning*

Whilst planning and building of settlements, resorts, recreational zones on the territory of seaside, it is necessary to be managed by principles as follows: conservation and rational using of valuable natural resources; keeping to norms of ecological loading of environment, marking out of landscape, recreational and reserve territories and prohibiting of industrial and another building there; keeping to sanitary norms, establishing of sanitary-protection zones for coastal strip protection, resources for water supplying, resorts, etc.

Building of coastal territories which are determined in accordance with project documentation, should be complex, stipulate reconstruction of existing buildings and communications and favour a new building based on adopted architectural-composition decisions with taking into account historical development of this or that territory. Whilst projecting and building, it is necessary to conserve historical centres and architectural ensembles, historical and cultural sites, valuable nature landscapes, view points for some sites; to limit number of storeys both of mass dwellings and tourist facilities when they vioalte the observation of surrounding landscape.

Whilst projects elaborating and building of coastal strip, it is necessary to foresee the means of its engineering preparation: engineering protection from flood, draining rain waters, drive against deplacing and mud flows, seismic fenomena preventing, etc. which are based on the engineer-building appraisal of the territory.

#### *Building*

Building materials which are used in construction works in coastal strips are to be ecologically safe. Using of toxic building materials such as: some kinds of plastic (especially polivynylchloride) and chemicals which make influence on climate and atmosphere changes (for example, CFCS, HFCS, HCFCS) are to be avoided.

Using of glues (for example, in order to glue construction blocks of prefabricated houses) is not recommended either because of their dangerous exhalation and durability (it is hard to disjoin glued constructions for their re-using).

The most effective building materials are those ones which demand minimal energetic affords (for example, adobe bricks and timber instead of aluminium, etc.) It is comfortable to use ready-made wood articles which are covered with natural oils and oil-paints. It is recommended to use grout for brickwork because it allows to re-use it whilst reconstruction.

In the process of building the means concerning natural beaches protection (prevent their trample down, beach materials annihilation, etc.) are to be fulfilled. Building materials should be conservated properly (a special capacities are to be used: containers, pallets, barrels, etc.)

### *Energy saving*

Whilst planning and building of coastal strips, it is recommended to use energy saving technologies, means and devices (economical buildings, automatized systems for heat supply, solar batteries, etc.)

### *Sewage cleaning*

Guidelines for sewage cleaning are done in the article “Sewage cleaning”.

### *Solid wastes processing*

The means concerning solid wastes processing and their discharge (it is naturally expected that they will be accumulated during the process of complex functioning) should be stipulated in the projects of tourism complexes development. These means are to be agreed with local power bodies.

Guidelines for solid wastes processing are done in the article “Urbanization”.

### *Rubbish*

The means concerning wastes processing and their discharge into sea coastal strips should be as a part of unite program which would be an integral part of general plan of management by coastal strip or tourism activity. The item as follows could be one of items of this plan: the system of drinks selling should meet the principle - security of tableware will be returned when empty tableware or plastic bags are returned. It is necessary to guarantee the keeping beaches clean (installation of sanitary storage tank for rubbish, litter receptacles, special containers for broken glass, etc.)

Hotel complexes, restaurants, shops and other facilities which are located near coastal strip, should be provided with means of processing of wastes and their discharge (litter receptacles, containers for rubbish, etc.) in order to avoid the penetration of wastes into the sea defined area.

Using of things valid for one occasion only (tableware, tablecloth, toiletries, etc.) is permitted if they are made of recyclable materials.

### *Water saving*

Lack of sweet water resources in seaside zones (taking into consideration increased demand of tourists in respect of it) is, as a rule, a limiting factor of tourism facilities development. Therefore it is recommended the taps, toilets, showers with automatic water supply to be installed there in the buildings.

#### *Transport and tourism*

Tourism facilities should have pedestrian communication with nature complexes which are projecting as a “landscape route corridors”, “ecological paths”, etc. For getting tourists’ bearings, touristic maps, advertising booklets, etc. are to be drawn up too. Guidelines for ground transport organization are done in the chapter “Transport”.

#### *Air transport*

Guidelines for ground transport organization are done in the chapter “Transport”.

#### *Education/propaganda*

One of the components of tourism development program should be the propaganda of means aimed at the environment protection among tourists, tourist managers and personnel of touristic firms. It may be reached by mean of different advertising production (leaflets, booklets, agitation shields, etc.) which are to educate in tourists’ mind the respect to the environment and local cultural traditions. Tourists should be able to acquaint with national traditions of the country of destination in advance.

#### *Industry of recreation and health improving*

Using of non-developed lots of seaside with aim of short-time recreation may be fulfilled on condition that it will not damage the environment. Without proper engineer and transport infrastructure these lots are not subject to building and sporty facilities organization which except to receive a big number of visitors.

#### *Beaches protection*

Methods of mechanized cleaning of beaches which damage beach covering are to be prohibited. The problem of beach regeneration and its replenishing by mean of proper beach material, is to be considered as a priority.

#### *Golfs grounds*

Nowadays the practice of golf courses organization is not available in Ukraine. In perspective it would be possible to create new touristic complexes in coastal strips, including golf-clubs with their grounds, club house, household facilities and corresponding stock, restaurants, shops, etc.

#### *Water saving in golf grounds*

When organizing golf grounds, it is necessary to take into account existing resources of ground waters, local climate conditions in order to choose turf kinds and means of irrigation.

The possibilities of water accumulation and re-using of rains, melted snow or any other alternative water resources are taking into consideration too.

#### *Using of pesticides and fertilisers on the golf grounds*

Regulations for integrated turf covering management contain recommendations concerning fertilizers and pesticides using on the golf grounds.

#### *Aquatics*

For all motorised boats the speed in coastal shallow zone is to be limited to 5 knots. Fulfilment of the demand of speed slowing is also required in ecologically sensible zones such as birds settlings, sea-gull colonies, etc.

Water scooters and other motorised boats or noisy transport means are not to be allowed in ecologically sensible zones and natural biotops for wild animals. It also concerns quiet places for rest. A special corridors are to be established for waters sports training. Underwater aqualung hunting for sea corals and other rare and ecologically sensible sea plants as well as sea animals should be prohibited.

## **XII. Transport**

### **12.1 Status and Trends**

Trend for increasing demands for transport services in condition of production volumes falling down, still takes place there and doesn't reduce. During last ten years the volumes of transportation took a third. The lion's share of fuel using - 83% of total volume - belongs to motor-transport. Nowadays a half of all cargos are conveyed by motor-transport. At the same time the volumes of freight by rail and by water took a third. The travellers prefer to use motor-cars. Last years the volumes of passenger road freightage has increased by a 90%, especially by a private motor-transport.

Without adopting of a new policy the last year trends will be continuing. It is expected that road freightage will be increasing and at the same time the transit by rail freightage will be stable. It is also expected a considerable growing of volumes of air freightage. Existing net of motorways will be unable to satisfy increasing demands of motor-transport. Therefore just now much attention is given to development of the most effective and comfortable combined transport nets which simultaneously could contain sea and road transport along sea coastal strips.

According to observations, the lack of attention to sea transport in European Common Transport Program led to crisis in shipping development. The main shortcoming which hinders the development of big and small sea ports which work for both interior trade and trade with countries which are in the heart of continent, is a disproportion in development of different transport means, in particularly, a factual hegemony of motor-transport (a big-tonnage transportations). As a result of such a development of events during last years, the part of small and average sea ports are on the decline.

### **12.2 Consequences**

Railways, motorways and roads occupy extremely long strips, create barriers which divide the areas into parts and/or isolate natural settlements. The more wide is a road (overloaded with transport) the more obstacles are there for living and migration of animals. The biggest part of areas is occupied by motor-transport. Additionally, actual trends of expansion of the net of motorways and motor highways guarantee more easy access to once remote and inaccessible and thus badly protected sea coastal strips. Easier access to remote coastal regions leads to their poor protection and this problem will have a trend to worsening due to the big growing of the process of urbanization of sea coastal strip. The motorways development has its negative consequences for social processes because this development violate the structure of local society due to a big level of noise.

Development of transport infrastructure may provoke negative changes of hydrology of coasts (both ground waters and surface resources) such as: erosion and ground displacing. As it is said in Blue Plan concerning Mediterranean region (and it is true for all other seaside regions) "the infrastructure of rail- and motor-transport which is located near seashores, violate natural processes of formation and development of coastal strip and may lead to expanded erosion which, in its turn, may destroy the transport infrastructure as such."

In order to guarantee normal conditions of transport nets working, additional land lots are required. For example, for filing stations, stops, garages and technical service stations, aerostations, etc. Such a way the surroundings including air, land and water around all

transport objects are contaminated, as a rule. Besides the pollution of land lots, the pollution of air by different transport means (especially by lorries and planes) is a threat not only for people's health but also for nature as well.

Acid rains make a damage to forests and fish populations. The process of eutrophication makes a damage to coastal fishing, and climate changes in future will make their negative influence on all the system of land using, especially in seaside zones. Pollution of air together with heightened level of vibration destroy historical buildings and other monuments of history and culture, i.e. just those places which attract tourists' attention. Heightened level of vibration may violate natural stability of coastal hills.

Sea transport is considered as a most ecologically safe one, but trends for sea speeds increasing will lead to non-stipulated using of fuel for each kilometre of sea voyage. Besides this, everyday discharges from ships (fuel and rubbish) are very harmful. The penetration of strange organisms through ballast water flowing out, led to serious and large-scale problems.

A big threat to the sea surroundings is a pollution from the side of big sea ports. This threat provoke erosion problems of adjoining coasts, natural settlings destroying, degradation of coastal ecosystems from excavation and ground alluvion for the new construction in zones of overmoisten territories. The ports is also a main reason of pollution (as a result of hold waters discharge), cleaning of ships bottoms from toxic chemical compounds and paints using.

Shipping of dangerous materials is a serious threat to the environment too. The overflow of such a materials (for example, oil - a well-known reason of the sea and coast pollution) can make a very negative damage for surroundings which, in its turn, will make influence on the economy as well (for example, tourism development, fishing, agriculture, health improving, etc.)

## **12.3 Possibilities**

Despite all the efforts and possibilities to replace the main loading of transportation from continental roads to rail and sea transport, the fact is still obvious that lorries, buses and private cars will convey the biggest part of goods and passengers. But a new generation of cars promise to reduce ecological loading on the environment. For example, so called cars-hybrids can work by turns both on electric batteries-accumulators (practically not contaminating surroundings) and on benzine or Diesel fuel (during driving the motor which use this fuel will charge the accumulator). The motor-cars which will use the batteries only when moving, and the cars which will use ecologically safe hydrogenous fuel are in the process of elaborating. Some models of these cars have already appeared in the market. Owing to these cars the discharges will be reduced and this will considerably improve the quality of air, especially in towns. Depending on kind of fuel, considerable changes to the best can be expected in reducing of hotbed gases discharge.

### **12.3.1 Guidelines for transport development in coastal strips**

For rational using of transport systems, it is necessary them to be guided by using of renovated sorts of energy where it's possible and in place. They should stimulate the development of ecologically safe kinds of urban transport. It is necessary to underline that the transport net is to be diversificated, i.e. the loading is to be transfered from motor transport to the rail one, from air transport to the rail and sea ones, both for transportation of cargos and passengers.

## *Roads*

According to usual practice, the roads are building by mean of widening of already existing highways and their step by step modernization. The road is to be projected in advance as a whole one in order to guarantee the protection of all surrounding values along the road which is building. It is necessary to foresee future necessity of roads widening. Whilst planning, the necessity of ecological system protection or its isolation avoiding are to be taken into consideration.

Before planning the building of roads or highways which potentially could damage great natural values, it is necessary to fulfil careful ecological investigations of projecting region, and these zones are to be especially determined. These investigations could find out the places where the interference is not allowed, or recommend the means for minimization of potential consequences for these places when the realization of building projects begins. Determination of main problems at the very early stage of projecting will guarantee the elaboration of the most effective means of their resolving in future.

It is also necessary to make investigations for examination of mutual dependence between hydrological and ecological peculiarities of the lot before planning the building of new highways. The using of valuable lots where the building can potentially destroy this mutual dependence, should be avoided. Consequences of divergence of hydrological characterisitic as well as obstacles concerning ecological and migration processes near the roads are to be minimised. For this aim it is necessary to use the most modern and most effective building technics. The main part of roads or motorways which are along sea coastal strips, could be successfully built to the heart of continental zone. In the zone with relatively not high ecological sensibility the access to the coast may be fulfilled by mean of narrow paths making. Barriers/fences along the paths which lead from parking to the beach, will prevent the vegetation cover trample down.

Destroying, breaking up or isolating of important settlings may be avoided if the building of tunnels is stipulated by the project. In those places where the building of a new road destroy natural settlings, new analogical settling will be created as a compensation. It will be bigger than the last one by its size or, at least, like it. If the road divides natural settling into two halves, then on the both sides of the road analogical settlings of approximately same size are to be created.

If a possibility, new settling should have channels of communication with another settlings of the same type. The flowings from roads and motor-ways before penetrating them into the environment and contaminating a very important natural settlings, are to be carefully processed. Different methods of natural cleaning of flowings may be used here. For example, using of lagoon or rush which are as a buffer zone for absorption of pollution elements.

In the places where powerful railways are available, it is necessary to avoid heavy-load transportations accross valuable ecological zones. The biggest new projects for motorways building are to change their orientation and transfer project investments to the development of infrastructure of rail and sea transport.

## *Pollution of air*

Wide using of transport means which work on electric batteries, hydrogenous fuel or combination of these two types - a so called "motorcars-hybrids" which practically don't

pollute the environment, will considerably favour the reducing of pollution of air in sea coastal strips.

For absorption of elements which contaminate the air along the biggest roads and motorways, it's useful to plant forest strips and shrubbery. Selection of plants species for these strips is to be done depending on their ability to absorb pollution elements and filter them, and characteristics of ground and water resources availability. But it is necessary to be very careful in order to avoid a species which in future would colonize the environment together with its natural settlings. Using of fuel with high content of lead is to be prohibited immediately and the content of sulphur in fuel is to be reduced as much as possible.

#### *Urban transport*

Alternatives to using of private motor-cars are to be attractive and comfortable. It is necessary to favour bicycle using by mean of creating of wide net of bicycle roads in the town. The drivers of motorised transport have to be orientated to bicyclists' presence.

#### *Transport and tourism*

Building of new roads or reconstruction of old ones are not to take place in coastal strip (at least, at a distance of 300m) parallel to seaside strip. Main motorways are to be located at a distance of some kilometres to the heart of continental zone, and access to the coast is to be effected by minor roads which are perpendicularly to the coast line and are built in places which are just predestinated for them. Car driving through the non-sanctional territories to the dunes or beaches or another ecologically sensible natural settlings is to be categorically prohibited, and parking is to be located in special lots. Plan of management by road-transportation movement is to be stipulated in the stage of pre-analysis of possible consequences.

Using of private motor-cars in coastal zone is to be limited by mean of creating of stops, filing stations and stations of technical service outside its limits. On the other hand, a comfortable access of urban transport means, as it was mentioned above, is to be guaranteed too.

Motor-cars which are not legally left by their owners in nature protection zone, are to be driven out in order to avoid the parking in these zones. The access of strange motor-cars to nature protection zones or another ecologically sensible areas is to be prohibited.

#### *Air transport*

It is not recommended to expand airlines and air transport movement and its infrastructure in coastal zones. Instead of this it is necessary to learn carefully all the possible ecologically safe alternatives to air transport.

Air transport which cause a big level of pollution and noise, is to be taken out of coastal strip.

#### *Ports*

Before to begin the building of new facilities for harbour equipping, it is necessary to learn all the possibilities of using of old ones for their re-equipment. If the installation of new equipment is necessary, it is necessary first of all, to examine the possibility of last grounds using for its installation.

### *Wastes discharge in the ports*

If in some ports there are no special wastes collectors, they are to be installed immediately and properly used. Payment for discharge of solid wastes and oil products wastes in the zone where port service is valid, may be included into the payment of general port duties.

Port administration should elaborate the plans of wastes discharge and processing. For this aim it is necessary to make the consultations with all interested persons. For ship command are to be adopted special rules, obligatory for fulfilment, which would demand to deliver wastes to special collectors located on the coast before the ship goes to the sea.

### *Wastes discharge when the ship is in the sea*

All the ship wastes are to be discharged in such a regime which wouldn't allow their penetration into the sea environment. If such a regime is not provided there in the ship, it is necessary to make analysis of characteristic and quantity of wastes which are generated by different types of ships. The analysis results makes possible the elaboration of means of avoiding and reducing of wastes quantity as well as organising technological and production processes of closed cycle.

The program of wastes discharge and processing is to be an integral part of the program of training of navy permanent establishment including their attestation. There in the ship is to be enough room and means for wastes conservation until they are safely discharged in the coast. It is necessary to keep ship magazine of wastes. A special observation crew must find out a non-sanctional wastes discharges from the ships and walk boats.

### *Ships: using and discharge of oil products*

Everyday discharges of oil products is a main reason of pollution of wide space of seas and oceans. If such a pollution proceeds from the ships, then the clauses of agreements of MARPOL, IMO, OSPAR, HELCOM and Barcelona Convention and corresponding attachments to MARPOL are to be severely applied.

The practice of direct flowing of chemicals which are used as a components of ballasts as well as the pollution of sea defined areas with oil products, are to be severely prosecuted.

### *Pollution of air*

All the new ships are to be equipped with the most modern installations for burning and technologies NOX for discharge. It is recommended the using of fuel with small content of sulphur.

### *Ecologically clean paints*

The paints which are alternative to those ones which contain TBT are to be used for ships painting; using of paints which contain this component is to be prohibited.

### *Flowing of oil*

Flowing of oil may happen everywhere and anytime, therefore local power bodies are to be always ready to take all necessary means to prevent this. Plans of non-stipulated and

emergency situations are to be elaborated in advance. Their realization is to take place in close collaboration with corresponding authorities and their neighbours.

It is prohibited to issue new permissions and licences for fulfilment of new works connecting with oil and oil products (including the building of oil terminals and oil-pipe-lines) until the plan for emergency situations be elaborated and adopted and enough quantity of technics and equipment for liquidation be given.

Shipbuilding plants which project and build oil-tankers should exchange tankers with one bottom for tankers with double bottom or another which could guarantee complete ecological safety. Introducing of increased insurance rates and taxes and duties collected from ships with one bottom, may be as a stimulation for such an exchange. Additionally, the ships with ballast tanks with sections could be offered to pay reduced tariffs of port customs taxes and duties. Governmental programs of licencing of activity could stipulate the demand as follows: all the ships independently their water-tonnage are to have got the insurance police.

The routes of ships are to be properly planned and not create a non-desirable risk. Coastal strips along the routes may be equipped with special protection means, especially in zones with ecologically sensible ecosystems and in those places where the local economy depends of cleanness of coastal environment.

In all the new types of tankers and another ships which are predestinated for transportation of dangerous and contaminating cargos, the systems which would double the most important operations (spare or emergency agregates) including 2 motors, preferably 2 screw propellers, 2 keels, 2 independent ship managing systems, are to be stipulated. Additionally, all the ships are to be provided with radio-answering machines.

Rescue tugs are to be located in strategically important or non-safe places in European coast in order to make them possible to give all necessary assistance in time. In all the cases when the environment is under the threat, the authorities must fulfil the managing and control of rescue operations. After shipwrecks which are connected with oil-products or oil flowing, the analysis of reasons and consequences for environment are to be done in order to make corresponding conclusions and avoid them in future. On the base of these analysis the corresponding means of avoiding of superfluous expenses and damage caused to ecosystems which are under the threat, are elaborating.

#### *Transportation of radioactive wastes*

Radioactive wastes including used fuel of atomic reactors, dressed plutonium or another highlyradioactive wastes are not to be transported by sea.

## **XIII. Urbanization**

### **13.1 Status and Trends**

Seaside of Ukraine has got an increased level of population concentration. 3% of the territory of the country are in its limits but only 14% of population live there (i.e. more that 7 mln.). Temps of increasing of urban population are higher than in whole in the country.

The big polyifunctional cities such as Odesa, Mariupol, Sevastopol, Mikolayiv, Kherson, Kerch and Berdyansk were created as a result of intensive processes of industrialization and

urbanization on the seaside. Yalta, Eupatoria, Alushta and Skadovsk are mainly monofunctional towns or so called town-resorts.

The building of seaside towns envelopes mainly the seaside lots. In the heart of the continent the building of Odesa and Mariupol only is popularized. Agglomerations of the town-resorts are on the Southern coast of Crimea and on the part of the North-West seaside of the Black Sea.

The compactness of dwelling and industrial building of the towns is lower than a norm is. Functional zonation of the towns is imperfect despite the trends of this process are mainly positive.

Reserves of the lands for urban building are considerable and it stipulates the slowing of increasing of the towns area the next period even if the increasing of population will take place there.

The creation of big lots of so called collective gardens (i.e. town inhabitants' dwellings) during the last period, is one of peculiarities of transgression. The location of these massiffes is mainly on the seaside.

The consequences of investment policy which is effecting in respect of local infrastructure facilities which were much more smaller than the expenses for dwelling and urban building, have a great importance for ecological situation as such.

## **Consequences**

The process of urbanization leads to serious consequences which make their negative influence on ecological quality of land, air, water and natural landscapes. Among them: impoverishment and pollution of ground waters, pollution of air and noise due to the urban transport, "occupation" of ecologically sensible natural ecotops, landscapes and best arable lands as well as narrowing of space which is necessary for normal running of natural processes of seaside ecosystems and destroying of aesthetics of the seaside.

Urbanization of seaside zones add new problems connecting with that the sea environment is more and more becoming a place of accumulation of different pollutions which destroy marine places of existence of plants and animals as well as coastal ones. As a consequence of it we can see a negative influence on development of tourism, fishing and agriculture. The territories where the negative conditions for people's living are available, envelop a considerable part of the seaside.

Discharge of pollutions through communal systems of canalizations are becoming a big threat for people's health. Even if primary and secondary systems of cleaning of communal sewage are available, urban cleaning systems are still responsible for large scale discharge of wastes into the environment (i.e. organic components which could lead to mass reproduction of toxic phytoplankton and thus make the problems of fishery and tourism more complicated). The widening of limits of seaside towns and their suburbs are often accompanying by changing of coastal strip which originate new problems.

The process of urbanization has also collateral consequences. For example, extraction of grounds, sand and another building materials for their further using in the process of

dwellings building, increase general volume of land loses due to urbanization. The process of urbanization lead very often to losing of sea space which is appropriate for fishing.

Urbanization in continental zone may have negative consequences for seaside coast as well. For example, the impoverishment of ground waters makes its negative influence on ecology of rivers, and thus on coastal strip, which after all may lead to ground waters pollution.

### **13.3 Possibilities**

Possibilities concerning the pressing of urbanization reducing are concluded in:

- introducing of special rules concerning planning and building of seaside towns;
- using of high price for PSM lands as a mean of economical limitation of their building;
- prohibition of building of lands which are subject to special protection and protective zones as well.

The experience since 1970 of using of limitations for placing of industrial and dwelling buildings on the seaside, testifies that using of administrative means only is not very efficient. More considerable positive results could guarantee the policy of regulating when the priority of economical key factors is valid.

In respect of ecological staying of sea coastal strips we can determine as positive the factor as follows: using of technologies (in planning and building of the towns areas, industrial objects and another facilities of economical predestination) which are favourable to ecologically rational development of towns. The compactness of urban building, including the components of natural landscapes to it, creation of favourable conditions to nature processes development (especially in respect of surface flowing) - these are the most ecologiclly appropriate directions of creating of urbanized formations on the seaside.

### **13.4 Guidelines for development of urbanization in sea coastal zone**

One of the main principles of rational development of sea coastal strips is a balance of limitations and permissions in respect of access to the seaside.

The bodies which plan the settling in coastal strip, should take into consideration people's desire to have them an access to the seaside because of various reasons, which could coincide or not (for example, for amusement on the one hand, and enjoying the nature calmness on the other one). Coastal spheres of industry also strive for access to coastal values. The avoiding of potential conflicts between different forms of land using may be reached by mean of functional coast zoning in order to guarantee each form its own zone.

At the same time it is necessary to take into account ecological sensibility and small number of natural coastal places of plants and animals existence. Special protection measures are to be guaranteed for hardly accessible zones.

The growing of scale of urbanization and planning of new towns in coastal regions are to be fulfilled from the point of view of the environment perspectives. The damage caused to coastal ecosystems is to be minimized by mean of containing of urbanization expanding. Concentration of buildings and infrastructure in a certain region is considered as positive for rational functioning of urban transport and energy saving. Further expanding of urbanized territory is to be "moved" into the heart of continental zone. In urbanized and adjoining to

them zones the system of plantations of valuable species of plants is to be conserved and efficiently maintained.

Obviously that the decision concerning the regulation of land lots predestinated for different aims, are to be based not only on the accounting of environment peculiarities of regions but on their social and economic peculiarities as well.

#### *Choosing of lots for industrial building and infrastructure*

Realization of development projects in coastal regions is to be done outside of sea coastal strip. In those places where the access to the sea is required by such a development, ecological problems may be annihilated by mean of establishing of continental bound of the building ground which will begin in a certain distance from the bound of the highest sea level and finish at a distance of some kilometres from cutting off the minimal sea level. These sizes may be considered as arbitrary but they also may be used as recommended ones. It is necessary to pay much attention to the peculiarities of geomorphological structure of region and possible influence on it.

The building located on the not very long ago created sedimental ground system are under the threat of influence of erosion processes. Placing of infrastructure or buildings in the region of dunes or salt marshes, or some buildings in zones of beaches, gorges and hills or near them, are able to annihilate these zones with further potential threat for the environment security.

The development in zones of overmoisten valleys or another zones of increased ecological value, may be as a serious threat, and such a development is to be avoided.

#### *Projecting and planning*

New projects and plans of urbanization of sea coastal strips are to be elaborated in such a way to avoid, at least, essential reducing of the level of negative consequences for coastal and sea environment. Guidelines on projecting and planning may be found in the chapter "Tourism".

#### *Building*

Guidelines on using of ecologically safe building materials and technologies may be met in the chapter "Tourism".

#### *Saving of water resources*

Guidelines on saving of water resources may be found in the chapter "Rational water resources management".

#### *Cleaning and processing of water*

Guidelines concerning the cleaning and processing of water may be found in the chapter "Rational water resources management".

#### *Discharge and processing of solid wastes*

One of the key moments of technology of rational discharge and processing of wastes is their preliminary sorting. The materials which are subject to further processing are to be collected separately (for example, paper, glass, aluminium, etc.). The containers for rubbish are to be

cleaned regularly (before they are overloaded). The recycling of materials are to be guaranteed in order to show to users that their contribution wasn't in vain. In those places where it is possible and in place, it is necessary to favour the composting of organic wastes, and to deliver a not expensive containers and composting equipment if required. The process of composting reduces the quantity of wastes which are to be discharged, as well as guarantees the receiving of valuable raw materials for increasing of grounds quality. In those places where it is impossible to organise the composting of organic wastes, the local authorities have to guarantee a large scale centralized post for organic wastes composting. The materials which cannot be processed or composted, are subject to discharge by mean of their dumping into special dust-bins or are to be burnt. The wastes dumps are to be located rather far from sea coastal strip. Existent dumps which can be met on seashores, riversides and other ecologically sensible zones are to be prohibited. New wastes dumps are to satisfy the most severe norms of environment protection, including the norms of their placing.

#### *Direct discharges of communal sewage into the sea environment*

Guidelines concerning direct discharges of communal sewage into the sea environment can be found in the chapter "Industry". The same principles and recommendations may be applied in respect of communal wastes.

#### *Rubbishing of area*

The development of the process of urbanization and the industry of rest and amusement as well as a reason of considerable accumulation of rubbish which is turning into the serious problem for the local authorities and sea and coastal environment.

Guidelines concerning rubbish wastes reducing can be found in the chapter "Tourism".

#### *Urban transport*

Alternatives to private motor-cars are to be attractive and comfortable. It is necessary to favour bicycle using by mean of creating of wide net of bicycle roads in the town. The drivers of motorised transport have to be orientated on bicyclists' presence.

#### *Renovation of ancient objects of seaside*

Abandoned buildings, ancient objects and their ruins may be of historical value and interest. They may be renovated and used as a private dwelling, or facilities for cultural means fulfilment, or tourism objects or places for rest.

In coastal regions these development programs will help to make touristic routes more variable which, in its turn, will considerably reduce the loading on natural zones.

Organization of tourists' transfer to these zones on the seaside (for example, by mean of continuation of existing routes of urban transport) together with desire to attract tourists to the places of renovated ancient epoch (for example, creation of parks of general using, walking paths, ethnographical museums, etc.) will considerably increase these objects' value.

#### *Development of sea ports: combating the wastes*

Guidelines concerning this question can be found in subsection "Shipping" of the chapter "Transport".

## **XIV. Water management**

### **Status and Trends**

All the steps of control of water distribution and water consuming - from reducing of demands concerning the water and stable supplying of drinking water, till appropriate discharge of sewage - is one of the most important factors of stable development.

Water economy management is a term which has a very wide notion and include both water sources and problems connected with them. Water resources include both surface and ground water sources. The problems touch upon both water quality and quantity in the context of development and health and nature protection.

Mechanisms of water economy management in Ukraine cannot guarantee efficient using of water resources. Despite a certain progress reached (from the point of view of legislation, i.e. norms which regulate water quality) there are a lot of problems concerning fulfilment of these norms.

Harmonization of Ukrainian water economy norms and European ones is a pre-requisit of the more efficient menas of protection of water environment of sea coastal strips.

Water sources of seaside of Ukraine are not sifficient. Water supply in this region is connected with the necessity of accumulation of surface flowing or with transportation of water to the considerable distance.

### **14.2 Consequences**

Quantity and quality of water which reach river deltas and ecosystems have a great importance for conservation of biological variety. Poor quality of water contains a lot of patogenic viruses, bacteria and toxic elements. It is dangerous not only for people's health but for wild flora and fauna as well. The level of concentration of harmful components in water and thus potential danger which can be caused to nature, partially depends of volumes of water which penetrate into the ecosystem.

Quantity of water which come up to sea coastal strip plays a very important role in existence of the system of coastal silts and in its ability to self-reproduction. The damming of courses of the rivers Dnipro, Dnister, Don, Pivdenny Bug reduced the volume of solid flowing and made its negative influence on the character of forming of sea coast in zones of influence of these rivers.

Over-regulating of flowing of almost all the rivers stipulate the reducing of volume of their flowing in comparison with natural volumes and favour the increasing of salinity of sea water. Negative ecological consequences made salinity of Azov Sea increased. At the same time, the places where sweet water comes up into the sea, were changed by building of great irrigation systems in sea coastal strip. As a result of it it is seen the reducing of salinity of sea water in a certain gulfsand estuaries. Ecologically negative results has a change of salt water for sweet one in the estuary of Sasik.

Quality and quantity of water mainly depend of human activity: needs of water, its over pumping out, pollution by sewage or direct discharge of flowings including industrial ones;

thermal pollution caused by electric stations; flowings from agricultural activity of motorways; building of dams; irrigation of lands; technological discharges from ships in the sea - these are only few factors.

Impoverishment of ground waters has a vital importance for coastal ecological system. This phenomenon becomes apparent in different factors. For example, it provokes the penetration of salt water into the sweet defined area of water; it also provokes erosion of ground and its sinking and salinity.

Pollution of water environment may take place within one only country; it may be provoked by discharges in the neighbour country and even by those ones which took place at a distance of 1000s kilometres. Negative consequences for coastal strip depend not only from discharge of sewage but very often from another dangerous materials which penetrate from canalization systems: industrial and another harmful wastes (for example, hospital flowings), wastes from production of plastic, detergents, chemicals, etc.

Combined canalization flowings are the biggest sources of communal pollution. This pollution is a big threat for coastal strips because it has a negative potential to damage not only a wild nature but people's health as well.

### **14.3 Possibilities**

Last time more and more attention is given to preventing of problems connected with water using and water sources pollution. The interest to using of alternative technologies of water cleaning, especially from small and average sources of pollution, is increasing. A great hope is given to ecological and engineering technologies of water cleaning. They are not expensive, demand non-considerable energetic expenses and are considered as ecologically safe alternatives for traditional systems of cleaning. Ecological and engineering technologies are used, created and renovated by natural systems such as: overmoisten lands and rush which are as a filter for pollution dangerous components.

A big interest has desalination of water for drink needs.

### **14.4 Guidelines concerning water using and leaning of sewage in coastal zones**

#### **14.4.1 Quality of water**

Authorities which are responsible for water consuming and cleaning have to proceed from natural and not artificial bounds of coastal strip.

No new bodies for ground waters are to be installed in coastal strips. The water supply is to be fulfilled from surface reservoirs only and in volumes which can be renovated due to annual precipitation. Ground waters of sand dunes which are accumulating due to precipitation without careful examination of all possible consequences for the environment, are not to be exploited.

The need of centralized water supply for domestic using may be reduced owing to creation of rain waters collection systems.

*Saving of water*

It may be reached by mean of maximal using of cleaned sewage (for example, for sprinkling or industrial technological processes). Saving of water may be also reached by mean of installation of the toilets which consume not much water, or such ones which compost the wastes, along the seaside.

In some regions the level of water consuming has reduced because of payment for water outfalls. When the level of water consuming is severaly rugulating, users' customs may be changed to the best by mean of efficient policy of price formation.

The considerable losing of water takes place because of its running out of piping. These runnings out may be prevented by mean of appropriate projecting of water supply net. When materials choosing, the characteristics of local ground, climate conditions, temperature regime of water predestinated for supplying, are to be taken into account first of all. Appropriate attention is to be given to materials selection because it is important for prevention of sewage flowing.

### *Irrigation*

Guidelines concerning the saving of ground waters by mean of limitation of irrigation volumes of arable lands can be found in the chapter "Agriculture".

## **14.4.2 Quality of water**

### *Cleaning of sewage*

Systems which are considered as a source of sewage are to be projected or re-projected in such a way to prevent the pollution from storm washing away as well as to guarantee the flowings be carefully cleaned. It is recommended to use tertiary cleaning (additional cleaning or alternative one) of all canalization flowings which penetrate into coastal water.

Discharge outfalls are to be located down-stream from places of bathing, spawning-ground and breeding grounds of molluscs an crustacea, lagoon and other zones which could be harmed from contaminants.

Local authorities may fulfil inventories of private sewers and cleaning installations, means of nutrient discharge and another sources of discharge of harmful elements in order to determine possible volumes of non-cleaned wastes penetration into ecosystems of coastal strips. In those places where it is possible and in place, it is necessary to examine the possibilities of using of ecological and engineering technologies for small- and medium-size sources of sewage.

It is also recommended to elaborate programs of increasing of social conscience in respect of water using and saving and wastes avoiding. These programs are of great importance for coastal strips surroundings protection. These programs are to be concentrated on the questions as follows:

- purchase products with re-usable and/or re-fillable packaging, and little or no throw-away packaging;
- avoid purchasing products containing toxic chemicals or compounds;
- avoid the use of unnecessary chemical in general, for example toilet and air fresheners;
- separate wastes for composting or recycling purposes;

- purchase household products (e.g. detergents) which are low in nitrogen, sulphur compound or another harmful substances (such as chlorine bleach);
- save water by mean of installation of appropriate devices in your rooms, bathrooms; automatic turning off water when not in use; collecting rainwater for plants watering, etc.; prevent the development of new activities which are considered as a big water consumer and are located in water poor regions.

#### *Industrial limitations*

Possibility of re-circulation of polluted water and sewage for another technological processes (agricultural irrigation, fertilizing, etc.) means that the further penetration of industrial sewage into the communal net of water-cleaning stations is to be stopped immediately.

#### *Drinking water*

In those places where possible, it is necessary to examine alternative technologies of disinfection instead of old ones, which will stipulate the using of chlorine compounds. It is recommended a wide using of water disinfection with applying of ultra-violet and biological technologies.

## **XV. Territories of special conservation concern. Nature-protected fund**

### **15.1 Status and Trends**

Natural reserve lots in coastal strips occupy much more part of general territory (around 8%) than in whole in the country (4%). The biosphere reserves Dunaysky and Chornomorsky, natural reserves Crimsky, Yaltimsky, Opuksky, Kasantisky, Mis Martyan, Azov-Sivash national natural park and many other objects of natural reserve fund are located on the seaside of Ukraine. The total net of these territories envelop practically all the types of natural complexes of Black and Azov Seas.

We can see a trend to forward increasing of quantity and area of protected territories in sea coastal strips.

Together with waterless valley, the considerable lots of seaside are also included into the net of natural reserve objects of seaside.

Valuable lots (from the point of view of their landscape and biological variety) of valleys of rivers of Dnipro, Pivdenny Bug and Dnister, coastal low land lots in the seaside of Crimea and Azov Sea coast, are not considered as reserve ones.

The territorial structure of areas which are subject to special protection, partially meets the conception of formation of All-Europe ecological net.

### **15.2 Consequences**

The availability of protected coastal objects has visible positive consequences in conservation of places of existence of populations of plants and animals. A special attention is to be given to water-marshy lands of worldwide importance which enveloped the main area of coastal interior sea water.

The places which favour birds migrations, are protected in limits of reserve territories. The conditions for reproduction of some species of fishes are also guaranteed here. Plant groups which are included into the Green Data Book of Ukraine are also numerous in protected territories.

Considerable majority of seaside landscapes takes place in natural reserve areas. There are a lot of plants and animals here which are included into the Red Data Book of Ukraine. The dispersing of net of coastal seaside objects is considered as its shortcoming.

Because of this dispersing, the preconditions for free migrations of plants and animals which are characteristic for natural complexes of sea coastal strips, were not created here.

### **15.3 Possibilities**

For forming more spacely united net of territories which are subject to special protection, a very favourable conditions were created here. As a result of extraction of the part of arable lands from use, a considerable part of lots of sea coastal strips became a nature protection lands. Consequently the territory of nature-protected fund might have sufficient increasing.

Preconditions are being developed for formation of ecological network in the framework of Pan-European Biological and Landscape Diversity Strategy.

#### **15.4 Basic recommendations for formation of ecological network of sea coastal zone**

To increase the territory of the ecological network of sea coastal zone it's necessary to:

- establish protected objects on the territories that correspond the requirements for protection of nature complexes;
- expand the amount of lands managed by nature-conservation organisations;
- provide conservation of nature landscapes within the territories having outstanding historical-cultural value;
- create and maintain water-protective zones and water-protective strips;
- set up transboundary nature protection objects of international importance;
- conserve degraded and contaminated lands following by forestation;
- provide conservation of nature landscapes on the lands of industry, transport, communication, defence;
- carry out special activities for securing the migration of animals and plants in the places of crossing of nature and transport corridors;
- carrying out special activities on the territories of ecological network to avoid destroying or suffering nature landscapes, nature plant communities included in the Green Data Book of Ukraine, conservation of animal and plant species, included in the Red data Book of Ukraine, improvement of habitats, creation of necessary conditions for breeding and dissemination in nature;
- particular importance are to be paid to protection of the habitats used during migration and wintering and creation the system for their protection.