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"PROTECTION AND DEVELOPMENT OF THE NATURAL AND BUILT ENVIRONMENT" SCENARIOS OF OMFB (NATIONAL COMMISSION FOR TECHNOLOGICAL DEVELOPMENT) TEP WORK GROUP

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Technology foresight - a systematic means of assessing that scientific and technological development which could have a strong impact on industrial competitiveness, wealth creation and quality of life - provides an essential tool to this end. Hungary launched her foresight programme in 1997. As the country is undergoing fundamental economic and social changes - that is, the transition towards market economy - major institutions are currently shaped. Foresight has seemed an adequate tool to bring together business, the science base and government in order to identify and respond to emerging opportunities in markets and technologies. The former socio-economic system has been influential concerning the organisation and management of TEP, too. It has been a well-considered, conscious decision from the very beginning not to involve anybody from the OMFB to run the programme (from a professional point of view, i.e. decision on panel topics, issues to be analysed, priority-setting, etc.). The Natural and Built Environment scenarios relating to the expectable state of the Hungarian built and natural environment come from the presumption that Hungary will become part of the European big-regional world economic centre in the medium run that is it will join the EU. Therefore, the future of Hungary in the next 30 years (up to 2030) was examined in relation to the EU regarding all the three scenarios.

Keywords: technology; foresight; environment

Introduction

Our world is characterised by an increasingly rapid change in which global trends cannot be stopped at national borders, and new technology plays a growing role. The world is also becoming more competitive, with national competitiveness depending on technological, organisational and social innovation. As it is widely realised firms cannot survive the ever more fierce, global, competition without spending on emerging technologies and strategic research. These activities, however, are often too risky or too expensive for industry to take sole responsibility for them. Therefore governments must assume at least part of the financial responsibility. This, in turn, requires setting R&D priorities, based on thorough, comprehensive, strategic analysis, as even the richest countries cannot afford to support all research programmes. Technology foresight - a systematic means of assessing that scientific and technological development which could have a strong impact on industrial competitiveness, wealth creation and quality of life - provides an essential tool to this end. Another reason why governments have to take part in foresight is that the exploitation of science and technology largely depends on effective networking between business, academia and government. Many governments have realised the importance of foresight activities, and thus this relatively new, and innovative, technology policy tool is spreading across continents. The consideration in this respect was that if Hungary during this period failed to join the EU for some reason the result would be great uncertainty and living from day to day in which no long-term strategy only short-term crisis management can be interpreted. The differences among the three versions are in the extent and pace of shift towards sustainable development [1].

Characteristics of the Hungarian Foresight Process

Hungary launched her foresight programme in 1997. As the country is undergoing fundamental economic and

social changes - that is, the transition towards market economy - major institutions are currently shaped. The first phase of the transition process is over by now - most firms and banks have been privatised, the most important new political and economic institutions have been re-established, e.g. a parliamentary democracy based on a multi-party system, stock exchange, and the so-called transition decline have turned into economic growth in the last few years -, therefore it is high time to think about medium- and long-term issues. In other words, now it is possible to devise strategies aimed at improving the quality of life and the long-term international competitiveness.

Aims and First Steps

Foresight has seemed an adequate tool to bring together business, the science base and government in order to identify and respond to emerging opportunities in markets and technologies. In short, TEP should result in a national innovation strategy based on a comprehensive analysis of

- world market opportunities (new markets and market niches)
- trends in technological development
- strengths and weaknesses of the Hungarian economy and R&D system.

The above, demanding, aim can only be achieved if researchers, business people and government officials join intellectual forces to assess Hungary's current competitive position and impacts of likely global market and technological trends. Hence their re-aligned and reinvigorated relationships can be regarded as a means of the principal goal. However, the process in which these experts with different background communicate and share ideas concentrating on longer term issues, generate consensus, and co-operate with increased commitment in devising and realising a national strategy, seems to be so crucial that it is an end in itself. In other words, the programme is also aiming at strengthening the formal and informal relationships among scientists and engineers, managers and civil servants, alike spreading the co-operative and strategic thinking.

Hungary is among the six countries about to join the European Union in the 'first wave'. Accession to the EU is a major challenge since it is likely to shape Hungary's future to a significant extent. Therefore it requires a clear - though sound - vision on Hungary's role and opportunities in the enlarged European socio-economic system. Thus TEP activities and results can contribute to the success of the integration process.

In short, written TEP results will be comprehensive analyses of strengths and weaknesses, scenarios based on these inquiries and likely global trends, as well as recommendations for public policies how to realise the most desirable scenario. These analyses and information should also assist Hungarian firms in devising and implementing their strategies to improve their competitiveness.

TEP is a holistic foresight programme, based on both panel activities (scenarios, SWOT analysis, recommendations, policy proposals, etc.) and a large scale Delphi survey. The two-year Programme will conclude in 1999. It is being conducted in three stages, namely pre-foresight (October 1997 - March 1998), main foresight (April 1998 - June 1999) and dissemination and implementation (July - December 1999) stages.

Awareness seminars were held across the country in the pre-foresight stage to promote this new concept among experts and professionals. Participants and organisers of these seminars (that is, chambers of commerce and scientific associations) were also invited to nominate panel members.

A Steering Group (SG) of 19 leading industrialists, academics and government officials was set up in October 1997 to oversee the Programme. Following a thorough discussion the SG has defined the following topics for panel discussions:

- Human resources (education, employment)
- Health (life sciences, pharmaceuticals, medical instruments, health care)
- Information technologies, telecommunication, media
- Natural and built environment
- Manufacturing and business processes (new materials and production techniques, supplier networks, globalisation. ..)
- Agrobusiness and food
- Transport

Having summarised the reasons to launch TEP, and the results of the pre-foresight stage, let us highlight some methodological issues in the remaining sections [1].

Strong Emphasis on Scenarios ('Macro' and Panel Level) Institutions and Regulation

Given the transition process, major institutions are still being shaped - as opposed to, for instance, the UK, where 'the lawn is cut and watered for centuries'. In other words, the fundamental institutions have crystallised in the advanced counties for quite some time, whereas Hungary is still at a cross-roads. Moreover, coming back from the Soviet political, military and economic bloc in an attempt to join the EU, which, in turn, is also in a middle of a major transition process, the wider, international institutional context (economic environment) where Hungary tries to find her room, is changing, too. Therefore it is of the utmost importance to analyse this turbulent environment, hence the emphasis on scenario-building, both at macro level (socio-economic framework conditions) and at the level of panels (micro, mezzo). Macro scenarios have not been developed in any other country engaged in foresight activities when we designed our programme.

For the same reasons, the Hungarian panels devote a significant part of their interest to institutional development and regulatory issues. It is also reflected in

the Hungarian Delphi-statements: quite a few of them deal with these issues, rather than technological ones.

Education and Learning as Input of Competitiveness

There was a *Leisure and Learning* panel in the first British foresight exercise, where learning was mainly understood as a market opportunity, not as a major factor of competitiveness. TEP has opted for the latter approach - for obvious reasons.

Employment as a Unique Issue

TEP has put together Education, learning and employment into one panel under the heading of Human resources. To our knowledge, employment has not been an issue anywhere else. Our decision, however, is self-explanatory in a country in transition.

Broad Issues as Panel Topics

In general, we have brought together various issues treated separately in most other foresight exercises. For example, our *Health* panel encompass life sciences, related fields of biotechnology, health care system, pharmaceuticals and medical instruments. Some of these issues are not analysed at all in other foresight exercises, e.g. the health care system, others are treated in separate panels, e.g. life sciences, pharmaceuticals (as part of chemicals). Also, agriculture and food processing belong to a single panel in our case (as opposed to the first British exercise).

Cross-Cutting Issues

Even so, we have also put strong emphasis on the so-called cross-cutting (cross-panel) issues. We encourage our panels to identify, and adequately deal with these issues (e.g. education and IT in all panels, the various factors of our health - life style, medical care, environment, diet; all these issues belonging to the different panels, although we have tried to set up panels around broad issues, accession to the EU, etc.). Some panels have already joined forces, i.e. their budget, in the early phase of our programme, and commissioned together a group of experts to analyse issues from different points of view (e.g. healthy diet: *Health - Agribusiness and Food Industry* panels, reasons of allergy: again the above two panels).

Given the legacy of the planned economy - that is, strong 'departmentalism' - and the inherent isolation of various disciplines, it can be regarded as an achievement in itself.

Organisation

The former socio-economic system has been influential concerning the organisation and management of TEP, too. It has been a well-considered, conscious decision from the very beginning not to involve anybody from the OMFB to run the programme (from a professional point of view, i.e. decision on panel topics, issues to be analysed, priority-setting, etc.). The role of OMFB has been restricted to provide finance and methodological support. Therefore no OMFB-official sits either on the Steering Group (SG), or is a member of any panel (the chairman of the Steering Group was the Head of the OST during the first British foresight programme). Moreover, members of the SG and panels have been appointed as a result of a wide consultation process. All the major decisions are taken by the SG, the panels or more recently at joint meetings of the SG and panel chairs and secretaries.

Finally let us present a highly subjective observation to highlight certain difficulties of the process.

Ambiguous ('Double') Legacy of Planning

Centrally set, mandatory plan targets were abolished in 1968 in Hungary, the first time among the centrally planned economies. Yet, its legacy is still rather strong among some experts with two, rather different, consequences, as far as foresight is concerned:

- some engineers and scientists understand foresight as just another form (tool) of (central) planning, and hence they want to devise just one future (vision, scenario, i.e. not different ones), and seeks funding for that target (as a sort of 'central development programme [plan]');
- some other professionals also understand foresight - at least at the first glance - as just another form (tool) of (central) planning, and hence they reject it immediately.

To sum up, the on-going Hungarian Technology Foresight Programme - its goals, methods and organisation - is shaped to a large extent by the legacy of the former socio-economic systems, their impacts on the national system(s) of innovation, the size of the country and the level of her economic development.

"Protection and Development of the Natural and Built Environment" Scenarios

In the course of drafting the possible scenario of the future, the following main principles and criteria are regarded as authoritative from "environmental" aspect.

- Global principle of sustainability. In this respect the examination of the long-term technological development is deemed important to see what accord is created between the life possibilities of

the current generation and the future generations. The basic principle of sustainability is that the short term benefits of the current economic, social activities should not be funded by the costs of the future.

- A big-regional (EU) and national criterion is to examine how our EU accession can be organised in a way that harmonisation with the EU and expectable economic growth should at the same time promote the improvement of the environmental elements of welfare. The process is related to the environmental protection requirements in the broadest sense since our development should be harmonised with the Fifth Environmental Action Program of the EU whose basic idea is sustainability.
- Regional analyses as well as municipality, entrepreneurial and household levels will play important role in accordance with the "subsidiarity" principle of the EU.

Investigation Levels of the Technologies

Regarding the technologies the approach is the following:

- Investigation of the treatment methods (technological, economic, social, political) of pollution and damage caused by former (probably still operating) polluting technologies.
- Moderation of negative impact of current polluting technologies operating now and in the near-future on the natural and built environment ("end of pipe" procedures, probably change of technology).
- Conditions for future development and introduction of environmentally sound technological developments and clean technologies, as well as domestic opportunities of environmental industry.
- In the case of all the above three investigation levels it is necessary to evaluate how technological changes themselves affect the Hungarian settlement structure, whether they modify and if they do in which direction the life opportunities of the population living in regions of different development levels and whether they contribute to the moderation of differences relating to the area and the type of residential place.

Possible Scenarios of the Future

The scenarios relating to the expectable state of the Hungarian built and natural environment come from the presumption that Hungary will become part of the European big-regional world economic centre in the medium run that is it will join the EU. Therefore the future of Hungary in the next 30 years (up to 2030) was examined in relation to the EU regarding all the three scenarios.

The consideration in this respect was that if Hungary during this period failed to join the EU for some reason the result would be great uncertainty and living from day to day in which no long-term strategy only short-term crisis management can be interpreted. The differences among the three versions are in the extent and pace of shift towards sustainable development [2-13].

Scenario of "Sustainable Development" (Optimistic Version)

The EU expanded with several new member states will strengthen its position against the North American and Asian centres. The increased internal market, the concentrated research and development expenditure will result in economic growth above the average in the world economy. One of its driving forces is the strengthening environmental industry, which decreases environmental load along with the historically rapid integration of clean technologies into the material basis of the economy. Regarding the use of resources there will be a shift towards human resources; the use of natural capital currently representing great proportion will decrease. Improving energy efficiency and the decrease of the specific use of material is partly the reason, partly the result of the shift in proportion, which means the products will demand fewer natural resources.

Environmental goals among the direct objectives of technological developments will have increasingly greater share; developments for environmental purposes are emerging among the most successful technologies.

A uniform system of standards covering all countries will spread as the framework condition of economic management and it will regulate the emission values of the individual technologies in details. The organisational and operational specifications of environmental management will be built into the organisational system of management units on the same level and consistency as in the current accountancy application.

The slow but continuous consumption growth of the current "developing world" – especially the Asian region – will revaluate the raw material stock. The significance of reuse and recycling of raw materials and products will increase in the European region which is poorly supplied by these stocks and consequently waste minimisation will be highlighted during the development and application of process technologies (within that water saving due to vulnerable fresh water reserves).

Regionally the support system of the EU is directed at the equalisation of the development levels of the member states and those of the regions within them, the role of borders among countries is becoming less important. The basic principle of regional supports and developments is the modernisation of the internal

resources of the given regions, in this way the individual regions will be related to and complementing each other as a network and will not be uniform regions side by side.

This scenario presumes that The European Union implements the goals given in the Fifth Environmental Action Program ("Towards Sustainability") and on that basis is able to advance in the first decade of the next millennium. Then between 2010 and 2030 the world economy will change accordingly and development in harmony with the environment will go on.

Hungary will become member of the EU by 2005 the latest. It will implement its National Environmental Program valid until 2002 which contains the principles of sustainability and on the basis of an improved program will realise harmonisation with the EU until 2010.

The country as a member of the EU will have a share of the benefits from the technological developments of the region. Company developments will be characterised by gradual spread of environmentally friendly, clean technologies, the economy will not be receptive to second-hand, second-class and consequently more polluting technologies.

The duration of use of the products (life cycle) will increase, this will make repair and maintenance more attractive with positive effects on employment.

The decrease of environmental load, the increase of environmental safety, the decrease of mobility resulting from more balanced regional development and the spread of work at home or nearby (consequently the moderation of pollution from transport) will on the whole result in the decline of health damage traced back to environmental harm.

Revaluation of human resources will result in a more evenly "spreading" training; the labour force demand of the individual regions will be met by "local" training. As a result of the development of informatics and telecommunication the scope of job opportunities at home and telecommunication services is expanding. In the wake of the above facts labour mobility will decrease and the moderation of harmful impact from transport will come as environmental impact.

The character of the settlement environment will be shifted towards so-called disperse towns (this tendency in Hungary primarily refers to the capital). Relatively big settlement structure of medium density providing space for the natural environment within the settlement and along the borders will become typical. Instead of traditional towns with one centre, settlements with several centres and playing servicing, supplying, and entertaining roles will strengthen. This settlement structure will deconcentrate environmental load typical of junctions and coming from transport and in general from the presence of concentrated crowds of people. At the same time the threat of the segregation of social groups relating to the individual settlement centres due to geographical proximity or other (e.g. ethnic) reasons will strengthen.

The importance of public transport will strengthen in order to reduce the pollution from urban and settlement transport, to suppress continuous stress and to ensure timesaving mobility. To this end a part of the transport routes on the surface (especially at junctions) will go under the surface which means underground construction technologies will gain ground.

The state of the country in general and within that the policy of the natural and built environment will be similar to that of the current EU cohesion countries (Ireland, Portugal, Spain, Greece) with the features resulting from the Eastern Central European situation. With the newly integrated countries an Eastern Central European Cohesion Zone will be created (Poland, Czech Republic, Hungary, Slovenia, probably Estonia) which – although lagging a little bit behind – will follow the principles of subsidiarity characteristic of the EU average which is also in line with the global environmental requirements of the world.

The European integration of the country will promote internal regional integration, the role of small-regions and small-communities as solving environmental problems will increase. The "subsidiarity" principle of the EU will exert influence also in reality.

In agriculture, production will be shifted towards organic products, organic and environmentally friendly procedures which will decrease the use of pesticides, fertilisers and the resultant soil pollution.

Biodiversity will not deteriorate further. This can be traced back partly to the spread of environmentally sound solutions of agriculture, the extension of national parks, environmental areas, more efficient nature conservation on those areas partly to improving environmental conscious attitude on social level. There will be possibility to resettle and preserve some traditional species.

The shift towards renewable energy sources may become significant, their share in optimum case may reach 10%. The use of solar energy regarded as an alternative today will continuously increase within energy supply (this will modify the construction technologies in addition to the application of collectors and photovoltaic cells in the case of solar traps at the buildings) and the application of earth houses using traditional heating combined with solar energy and the use biomass will spread. Construction technologies will be modified. The materials of the buildings will not change basically but the efficiency of insulation technologies will significantly improve.

Imposing tax on non-renewable resources will gain ground in economic regulation while taxes, contributions which employment entails will decrease. In this way the regulation in addition to the reduction of environmental pollution will also decrease unemployment.

The attitude of environmentally conscious management will increase within company management.

The concept of "consumption" will have different value, the demand for healthy way of life will increase in the category of life quality. Then not only the interests of the individuals will have an important role but the "maintenance" of human resources revaluated within the production resources will become a strong economic interest. With the spread of waste minimisation technologies and the increase of the non-material consumption elements of life quality (which will reduce the demand for material goods), environmental load will decrease and requirements for some technologies prompted by environmental safety (decrease of the threat of accidents causing environmental and health damage) will simultaneously increase.

A decisive criterion of technological developments and installations is the minimisation of the health damage of the affected population. The external costs of health damage of environmental origin will not come from central funds but will be built into costs on company level especially on the basis of the polluter pays principle.

Immaterial value scale will become dominant in family and school education, life quality will have priority over pursuing material goods. Raising environmental awareness will become a cornerstone of the education system from the lowest level (nurseries) to higher education including further training on different levels. The educational system will deal with environmental impacts of given areas as an organic part of certain subject matters, professions and fields, in addition it will regard and apply environmentally sound thinking as the basic element of education relating to the way of life [2-13].

"Business as Usual" Scenario

Slow economic growth is going on in the European Union, the position of the region in the world economy will slightly deteriorate and the Union will not implement the program of sustainable development. The traditional growth orientated development of the world economy will significantly delay the environmentally sound transformation of the profit-orientated relations of nature-economy.

The Union funds will grow slowly due to the resistance of the donor countries and the demand of the formerly integrated cohesion countries will be strong to preserve the support resources. The Central Eastern European cohesion integration will proceed slowly.

Hungary will join the European Union after 2005 but the practice of "sustainable growth" will devaluate the principles of "sustainable development" and will significantly delay realisation.

The current production-consumption structure will survive. The proportion of technical development will remain low, the economy will be determined by lease work. (The current level of R+D and the role of Hungarian research development centres will keep decreasing.) The financially most successful technologies will not be aimed directly at the protection of environmental elements but as an additional benefit of their application environmental load will decrease.

EU support will go for road transport within infrastructure development and more environmentally friendly transport solutions will relatively decrease. Accelerated motorway constructions will strengthen the transit nature of the country. The above endeavour is in accordance with the Hungarian development of motor-car production.

Differences between the Transdanubian and Eastern regions regarding regional development will not decrease.

Regarding technological development the basically Hungarian owned small and medium sectors will lag behind the advanced level of international large companies. In Hungary the multinational companies with high capital level use first class technologies of environmentally friendly nature. Small and medium companies – due to relative capital shortage – on the other hand take over second class procedures, which environmentally are more detrimental. The spread of the latter ones however is not typical. Environmental regulation will remain relatively soft since the resistance of the majority of both the population and businesses is strong. Within environmental solutions subsequent environmental protection of low efficiency will dominate.

Primarily large companies and their suppliers use organisational and operational forms according to Environmental Management System, which is based on the continuous development of ISO 14001 standard. The number of certified companies working on the basis of EMS will be a few thousand in Hungary.

The environmental industrial products and services will be imported into the country deteriorating the international balance of payment.

The environmental-health situation will stagnate, in some fields will deteriorate especially in big crowded cities. Monitoring systems to observe the impacts of technologies resulting in health damage of environmental origin will be established. During company installations and expansions, environmental impact assessment will certify on the basis of standards tighter than the current environmental-health ones, the contacts between environmental and health authorities will be continuous. At the same time strategic impact assessments will be hardly used for developments.

A part of the valuable natural areas will be lost because of infrastructure development and green field industrial investments.

Energy efficiency will improve slowly, the interest to increase energy production is much greater than to increase energy efficiency (basic power station fuelled by lignite, perhaps new nuclear power station).

Because of the poor enforcement of the principle of subsidiarity the role of local governments to reduce environmental damage will strengthen only slightly. The local governments of settlements will organisationally expand and staff trained for

environmental tasks will be employed. Local governments will have greater control over duties and fees contributed for environmental purposes. In the case of the remaining centralised funds not only a distribution system per capita will exist, the nature and extent of the pollution to be cleaned up will also have significant impact.

The environmental tasks of the Hungarian local governments will be concentrated on two fields that is waste disposal and sewage purification.

Knowledge relating to environmental protection as a separate subject will have a broadening role in the educational system, especially on secondary level. This profile of higher education is expanding especially in the fields of waste treatment technologies and environmental management. Public thinking is primarily influenced by environmental information in the media given separately or built in other types of information. Environmental awareness of the public, however, changes slowly because of other impacts working against the environment.

It is increasingly difficult for the country to meet the requirements stipulated by international environmental conventions [2-13].

"Delayed Accession" Scenario (Pessimistic Version)

The European Union among the major world economic centres regarding power will fall into the background. Traditional market solutions will dominate in the world economy. Global and regional conflicts will sharpen and the permanent crisis management will absorb significant resources. Subsequent (end of pipe) instruments of both environmentally and economically low efficiency will become typical in environmental protection. Only multinational companies – primarily to ensure their green image – apply the slowly changing standards of environmental management. The standards in the world economic regions are different regarding the stringency of the stipulations.

Because of the sharpening world economic contradictions the development of the EU will relatively slow down and accession will be postponed to 2010 or later. In Hungary the position of environmental protection will deteriorate and will be subordinated to economic growth of low efficiency. The driving force of technological developments will be profit maximisation in the short term, the reduction of the load on environmental elements with its long-term, indirect benefits will be left out of the group of the economically most successful technologies. Rapid developments responding to existing state deterioration will have priority.

The threat of using environment polluting technologies in industrial production as a result of economic constraints will grow, the enforcement of environmental criteria will be weak. The number of companies certified on the basis of environmental standards will stagnate at some hundreds.

Hungary will be on the periphery within the Union, it will determine the level of technologies used here which is typically second class with all the environmental disadvantages. The major countries of the European region will see the Eastern end as the domain of the relatively most polluting technologies, development funds will be aimed at the take-over of these technologies.

Agricultural production is going on with environmentally polluting methods on fragmented areas with ownership structure transformed as result of the lack of knowledge and capital. Negative effects of former polluting agricultural technologies (primarily soil pollution) will not be eliminated.

Processes resulting from the transit character of the country will strengthen in transport, the proportion of road development will grow while the role of railway and public transport will decrease. The vehicle fleet will become older and the technical state will further deteriorate.

As a result of short term developments with direct benefit, the second class polluting technologies coming to Hungary and the limited budget opportunities, monitoring of health damage of environmental origin and the treatment of damage on social level will not be highlighted issues. Prevention will be restricted and limited to spectacular emergencies (e.g. chemical accidents) which are easily perceptible for the public. The share and typical impact of health damage resulting from environmental pollution will not be clarified.

The development funds of local governments usable for environmental protection will be restricted. There is no stake to employ experts who can manage environmental issues on the merit, the regional environmental authorities will control the remediation processes. Funds for environmental purposes will be centralised, the distribution system per capita will work or the funds will be used to eliminate emerging damage.

The importance of the medium strata in the society will not change, the development of the civil society will be slow, sensitivity to non-material values and environmental awareness will be on low level. The media will only moderately influence environmental thinking that has subordinated role in the social scale of values since it has no value for advertisement. Education will primarily concentrate on knowledge necessary for remediation, the scope of training involving secondary and higher education will be relatively narrow. Environmentally friendly way of life will be in the periphery in education, the attitude based on the utility of people measurable in money will prepare the new generation for careers which entail the possession of material goods and are deemed successful by the public.

The peripheral nature of the joining Central Eastern European countries will remain durable. The regional differences and conflicts within the country will strengthen. Through lack of adequate resources the Eastern territories will not close up fast, developments

will be concentrated on areas with existing infrastructure and better qualified labour.

Biodiversity will drastically deteriorate. The reasons are: decrease of the extent of nature conservation areas, moderation of financial means to preserve values there, utilisation of many chemicals in agriculture on extending territory and narrowing natural living space [2-13].

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