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THE ENVIRONMENTAL DIMENSION OF  
NATIONAL SECURITY:  
THE RESULTS OF A SYSTEMS ANALYSIS STUDY\*

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## THE ENVIRONMENTAL DIMENSION OF NATIONAL SECURITY:

### THE RESULTS OF A SYSTEMS ANALYSIS STUDY

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Sophisticated research of a national security\* problem permits us to disclose its comprehensive nature. In terms of systems analysis, I consider it as system  $S_3$ , consisting of various subsystems and elements. From the latter, environmental subsystem marked as  $S_E$ , will be studied in detail in this paper. A special analysis of this particular component of the national security problem seems to be very important and timely particularly from a theoretical point of view.

As early as 1956, The Report of the Committee of Three on Non-Military Cooperation of NATO argued that:

security is today far more than a military matter. The strengthening of political consultations and economic cooperation, the development of resources, progress in education and public understanding all these can be as important for the protection of the security of nation or an alliance as the building of a battleship or the equipping of an army. (Cited from: The North Atlantic Treaty Organization, 1989).

However, in spite of this timely and important observation I dare say that progress in transforming it into a systems concept, have

not been impressive. Judging from the available scientific literature, it seems to me that environmental as well as other "nonmilitary" aspects of national security have not been elucidated adequately. Until now the bulk of research in this field as a rule has been confined to analyzing the impact of combat activities on the environment (scenarios of the "nuclear winter," environmental consequence of the war in Vietnam, etc.) which is worthwhile but still not enough.

Secondly, a systems study of the environmental dimension of national security is very important in practical terms. For example, nowadays in the USSR, costs for dealing with ineffective use of natural resources, pollution and its impact on human's health can be assessed as being 15-17% of the national GNP (Porfiriev, 1990). This means that the amount of resources necessary to compensate fully this negative impact, and thus provide long-range environmental stability, is comparable or even exceeds the budget allocations for defense needs, or in other words, for military-political security.

Earlier while discussing the problem of structuring of the  $S_3$  system (see footnote at end of article) I stressed the possibility of a dual interpretation of environmental security as a category, taking into account its two main aspects. On the one hand, considering  $S_E$  as an element or subsystem of  $S_3$ , and based on the object of environmental security as a category, its aim can be defined as protecting from any destructive impacts of the national territory the life, health or more correctly the quality of life

(QL) and health (QH) of the population, and its environmental rights and conditions of living (QE). On the other hand, analyzing  $S_3$  from the viewpoint of the origin of the hazards jeopardizing its stability, including environmental ones, the objective of  $S_E$  may be interpreted as particularly defending the society or the system  $S_3$  and its subsystems  $S_1$  (personal security) and  $S_2$  (social groups security), from these destabilizing impacts.

Obviously, both aspects or interpretations are mutually compatible. One of them clearly delineates the object of environmental security, but lacks any specification of the destabilizing factors or sources of hazards, and another does it vice versa. Let us consider these aspects, one after another, using parameters QL, QH and QE, to characterize the aim of  $S_E$  and making the environmental factors of  $S_3$  destabilizing as  $F_E$ .

1. The object, criteria and objective of environmental security.

As already mentioned, protecting QL and QH serves as the main objective and at the same time the main criteria of  $S_E$ , while conservation or upgrading of QE should be considered as a secondary criterion. At the same time, parameters QL and QH are dependable on QE.

$$I_{QL} = f(I_{QH}, I_{QE}) \quad (1)$$

$$I_{QE} = f(I_{QH}, I_{QL}) \quad (2)$$

where I embrace respectively by the integral indexes, and  $DI^t$  means changes of I in the space time of t.

Stressing the fact that criterion QE is secondary, respective to QL and QL, is in no way an effort to limit the category of environmental quality to purely medical and ecological aspects, and thus to reject its esthetics, cultural and other values, especially taking into account that criterion QL is not exhausted by the state of health. But having no intention to discuss the problem of environmental protection, but rather considering the issues dealing with environmental security (i.e. minimizing the risk of hazardous environmental impact on human health), I have put the mentioned aspects of both of the criteria QE and QL in the first place.

That is why in the following characteristics of environmental security, I will use integral index  $I_{QH}$ , reflecting the state of somatic, psychiatric and moral health of the society (nation). This index facilitates formalizing the main criterion or functional objective of  $S_E$ , as well as conditions to realize it. The life and health protection from destabilizing natural and technological impacts implies:

A) the nondeteriorating of parameters inclusive to  $I_{QH}$  in those social groups or in those territories where these indicators are recognized by the nation as satisfactory or acceptable. In general, it is an imperative condition for stability.

B) the upgrading of  $I_{QH}$  indicators in all other situations that in general means the developmental condition of the society of system  $E_3$ .

$$I_{QH}^{t_0} > I_{QH}^{AC} \quad (3) \quad \text{or} \quad DI_{QH} > 0 \quad (4)$$

where  $I_{QH}$  is an integral index of health quality in a moment  $t_0$  (basic year);  $I^{AC}$  is a standard national index, considered acceptable by the society for a certain number of years previous to  $t_0$ .

The equality of the left and right parts in the formulas (3) and (4) corresponds to the situation A, whereas situation B is characterized by the nonstrict parts of these formulas.

Using the categories of quality of life and health as well as corresponding integral indexes, thus turns out to be very fruitful in specifying the essence of environmental security. But that does not mean that identifying and calculating of  $I_{QH}$  indicators is an easy task either methodologically or practically. It is a sophisticated task evolving the elaboration of a cluster of qualitatively different indicators, its calculation and then aggregation in "non-dimensional" indexes. As a rule, the necessary statistical base either is lacking or is inadequate, and much time and major efforts are needed to close somewhat this lacuna. Nevertheless, the problem does not seem to have no solution because some concrete approaches already exist and are used in various countries and international organizations.

In particular, such an indicator as average life expectancy ( $D_L$ ), serving one of the main parameters of  $I_{QH}$  is well known and widely used. Taking  $D^{AC}$  as the national average life duration calculated for certain  $Dt$  (where  $Dt = 10-20$  years) previous to basic year  $t_0$ , and  $D_L$  as an average life expectancy starting from

$t_0$  the first inequality of formulas (3) and (4) may be rewritten as:

$$D_L^{t_0} > D_L^{AC} \quad (5) \quad \text{or} \quad DD_L > 0 \quad (6)$$

In case that these conditions are not fulfilled, systems  $S_3$  and its subsystems  $S_2$  and  $S_1$  are unstable, and the state of the system  $E_3$  and its subsystems  $E_2$  and  $E_1$  can not be indicated as secure considering the environmental criterion.

In the USSR, such subsystems include in particular the Zaporogye (Ukraine) and the Aral regions in the Middle Asia where average life expectancy decreases as a result of a negative environmental impact: the industrial and agricultural (pesticides) pollution of air and water respectively. In those regions, for example the Aral region, a sharp decrease of  $I_{QH}$  is also taking place. Due to heavy pollution of potable water by chemicals (fertilizers, pesticides, etc.) in the Karakalpak autonomous republic more than 70% of the elderly population and 80% of children suffer from one or several diseases, 90% of pregnant women have anemia, 10% of babies die before 1 year and where for every five military-service-age persons one is rejected as a soldier by doctors considering his small weight and height. In the Tashauz region of Turkmenia, an average family has three ill members, 80% of women and children suffer from anemia, and the TB morbidity exceeds by three that of the average figure for the USSR.

Another indicator somewhat analogous to  $D_L$  and also useful in measuring  $I_{QH}$  is a risk of death due to various reasons. Founded

on the concept of acceptable risk, marking it as  $R_{QL, QH}$  and calculating it retrospectively as a possibility of death due to aging formulas (3) and (4) may be presented in the following way:

$$R_{QH}^{T_0} < R_{QH}^{AC} \quad (7) \quad \text{or} \quad DR_{QH} < 0 \quad (8)$$

The methodology of R calculations is thoroughly developed by well known analysts including C. Starr, B. Fischhoff, S. Lichtenstein, P. Slovic, H. Kunreuther from the USA; K. Vlek, P.I. Stallen from the Netherlands, H. Otway, T. O'Riordan from the UK, and others. (Slovic, Fischhoff and Lichtenstein, 1979, 1980; Slovic, 1987; Kunreuther, 1980; Otway, 1976; Otway and Tomas, 1982; Vlek and Stallen, 1981).

Generally speaking,  $I_{QH}$  as well as  $D_L$  and  $R_{QH}$  depend on various factors. But considering the context of environmental security analysis, the imperatives fixed in the formulas (3) - (8) refer only to exogenous impacts (in relation to a person or  $S_1$  i.e. the basic element of the systems  $E_3$  and  $S_3$  respectively) which jeopardize one's health and life. This fact is reflected in formulas (1) and (2). It should be added that all other factors or elements, except QE (political, economic, etc.) constituting the system  $S_3$ , taken as constant, the latter will be analogous to  $S_3$ :

$$I_N = \text{const} \\ 7S_3 - S_E \quad (9)$$

where  $I_N$  is an integral index of N nonenvironmental parameters.



As far as endogenous (relative to  $E_1$ ) impacts on parameter QH are concerned, including habits, customs, etc., they refer to the category of individual risk and do not belong to environmental hazards, or in other words to environmental factors hampering the national security of  $S_3$  system contrary to the earlier mentioned exogenous impacts.

## 2. Environmental factors destabilizing the national security

These factors marked previously as  $F_E$  may be subdivided into two main groups: ecological (natural) and techno- ecological or in other terms, producing direct and indirect impacts. The first group ( $F_E$ ) incorporates the sources and factors risky for  $S_3$ , including  $S_E$ , representing a direct hazard both for the objects of these systems and for the environment per se.  $F_E$  usually have purely natural genesis and include natural disasters caused by tectonic, oceanic and other natural processes. In rare cases, these disasters may stem from artificial sources induced by economic activities (e.g., mining, dam construction, etc.) or intensively used methods of geophysical war. With certain reservations, some types of infectious diseases can also be included in the mentioned group. They have natural etiology but start to represent a serious hazard to social systems stability, only becoming pandemic, because of interactions between people.

Natural disaster's destabilizing impact on population and economy of many countries of the world, including the USSR, the USA and UK is substantially impressive. As far as the Soviet Union is concerned direct losses caused by these disasters are soaring to

3.5-4 billion of rubles or approximately 0.4% of GNP annually. If indirect costs are considered as well, the figure mentioned increases to no less than 6-8 billion of rubles per year, not taking into account the volume of agricultural losses. The increase is 15-20 billion of rubles or about 2% of GNP if the latter are included. These figures do not include compensation for victims losses. I believe their average number constitutes about 150-200 per year, and the treatment of several thousands of injured persons. This kind of cost is relatively small due to poor insurance and medical service support in the country.

The presented figures may seem not so impressive at first glance, compared to budget military allocations that officially reach about 8% of the Soviet GNP and that according to alternative sources, skyrocket to 15-20% of GNP (Sverdlik, 1990). But if these indicators are compared to the respective US ones, it can be observed that the gap between the shares of GNP concerning disaster losses is approximately 1:3.5/4 and relating to military expenditures equals to roughly 1:2.5. That means that the  $F_E$  load on economic basis constituting the core of economic security in relative terms, should be considered as noticeable.

In particular, it is impressive that the regions prone to natural hazards cover about 70% of the Soviet territory, including more than 40% of seimosensitive areas (in the USA the latter embraces about 1/3 of the surface). In 1960, around 13% of the Soviet population lived in mountainous regions; in 1990 this share exceeded 20% (about 60 million people). According to some

estimates, those areas have up to 16% of the USSR national wealth, and if all hazard-prone regions are included this figure may reach 25% (Baburin, 1990). Armenia having lost 0.7% of its population and having suffered losses equivalent to 150% of its GNP, can be compared to World War II negative effects on the republic. It presents one of the most tragic and at the same time vivid example of the regions that recently have confronted large-scale natural disasters.

Another group of destabilizing factors are called technological. Marked as  $F_E$  they include technogenic sources and factors menacing to life and health, security of persons, and things they value (i.e. to  $S_E$  and  $S_a$ ) and indirectly through feedback impact the technologically changed environment on the social system  $E^3$  and its subsystems  $E_2$  and  $E_1$ . These negative environmental changes that result in pronounced deterioration of quality and  $I_{QE}$  decrease, are caused by human activities both in war and peace times.

Analysis of combat actions impact on biosphere should be considered as an important area of research that until now have been limited to either elaborating scenarios of environmental consequences of a nuclear war (the well known "nuclear winter" models), or studying the analogous impacts of the Vietnam war, especially of the agent orange spray on tropical forests and soils. As far as I know, analysis of the environmental impact of World War II in the USSR has also been confined to assessment of forest losses, though more comprehensive and scrutinized research should

facilitate better understanding of destructive potential of conventional armaments for ecosystems and  $S_E$  as a whole.

I should like to note that practically in all cases mentioned the combat activities were primarily oriented on destroying the enemy's combat potential. Environmental deterioration was only a consequence of those actions. Even defoliants in Vietnam were used by the US Air force to disclose guerrilla troops hidden in tropical forests rather than smashing the latter per se, though it does not reverse the substantial negative environmental impact of this action.

Nowadays, the recent war in the Persian Gulf perhaps for the first time in world's history presents an example of the new type of combat activities that can be characterized as environmental war. The spilling of enormous volumes (about 500 thousand tons) of crude oil from Kuwait stocks into the Gulf waters by Hussein's army has been especially designed to ruin the marine environment and provoke an ecological disaster. The main objective of this new type of war is to destroy all elements of  $S_E$  system including QH and QE. In that it differs from previous kinds of wars which did not aim predominantly or primarily on environmental destruction. That is why I consider the detailed and systems study of this phenomenon is becoming an actual and important field of research concerning environmental security issues and the whole problem of national security.

As far as peacetime  $F_E$  factors are concerned the negative impact on both  $S_E$  and  $S_3$  in general is produced while economic

activities take place. This impact manifests itself in two main forms including acute or blast-like (disasters, catastrophes) and chronic one that is typical for routine functioning of industries. Correspondingly, it is possible to differentiate a sharp or unexpected destabilizing of  $S_E$  resulting from immediate emission of considerable amount of power or substance into milieu and its gradual destabilizing caused through accumulating of hazardous and destructive components in environment and relatively slow ruining of the latter.

The sources of risk in this case are concentrated both in the civilian and military sectors of the national economy. Surely this cross-cutting is more or less conditional because the majority of industries is of dual purpose, producing both civilian and military goods. Nevertheless, this traditional classification is fruitful for systems analysis of environmental security problem considering that until now Soviet studies of its military aspects for understandable reasons have been restricted to impact of combat activities abroad. In the following, using the USSR as a case, I shall argue that in peace time the destabilizing impact of enterprises related to military and industrial complexes on environment is rather substantial. Environmental impact produced by many civilian industries is in no way less impressive, a fact widely known by the public compared to the previous situation.

I would like to begin the analysis of the destabilizing forms of  $S_E$  mentioned earlier with a significant point. Today the destructive potential of large scale technological disasters is

comparable to that of military activities. The energy power sector of the world economy now manufactures and stockpiles more than 10 billion of tons of raw materials that can burn or explode. This figure does not differ too much from the volume of nuclear armaments accumulated through the decades. Highly hazardous chemical components like ammonia, phosgene and others have been produced, stockpiled and transported in quantities equivalent to hundreds or even thousands of billions of lethal doses. This is one or two orders more than the volume of accumulated radioactive materials calculated by the same measurement system (Legasov, 1987). The destructive effect of some technological disasters and combat actions is comparable as well. For example, the total number of persons killed and wounded by nuclear bombing in Nagasaki in 1945 was about 140 thousand while the same indicator for the Bhopal chemical plant explosion that took place 40 years later equaled to more than 220 thousand injured.

In the framework of analyzing of  $S_E$  destabilizing problem environmental and ecomedical consequences of technological disaster should be considered as especially important. The latter's scale can be assessed using as a case study the USSR nuclear power complex, including both electric production for civilian and plutonium production for military purposes.

As far as the military component of that complex is concerned, one should immediately note the Kyshtym radiological accident that took place in 1957 in the Southern Urals. It resulted in the emitting of about 20 million of curies of  $^{239}\text{Pu}$ , the forming of a

radioactive cloud on the scale of 105 x 8 Km, the polluting of more than 15 thousand of Sq. Km, and the taking 160 sq. Km of arable lands out of production. More than 10,000 persons were evacuated from 23 villages; the accumulative costs of that procedure and compensations reached 2 billion of rubles in current prices (Nikipelov et al, 1989).

In spite of the substantial time that passed after that accident its consequences should still be considered as significant although not all Soviet specialists share this view. For example, B. V. Nikipelov et al., argue that the medical surveys of population of the suffered area do not show any case of acute, subacute or chronic radiation sickness. At the same time, according to Professor V. A. Shevchenko's data no less than 1,000 persons suffered chronic radiation sickness. There have been significant changes in cardiovascular pathologies rates as well as endocrine ones, blood creating systems dysfunctions and neuropsychogenic stresses which can be easily traced. The leukemia incidence rate has doubled (Shevchenko, 1990). A considerable amount of radionucleids has been absorbed into food, in milk in particular, from the households left on polluted territory. Many indicators of the morbidity spectrum of the suffering population in the Southern Urals region are similar to that of Chernobyl areas where I performed my field studies. So the reasoning of Professor V. A. Shevchenko and some other prominent specialists like professor H. B. Burlakova I consider more sound.

As to the Chernobyl accident per se, it should be taken as the

most tragic and known evidence of a large scale civil technological disaster with environmental consequences comparable to those of some contemporary combat operations. Moreover, from the viewpoint of its long-term results it represents the worst accident in the history of modern society (Verchovniy Soviet, 1990). It includes about 30 dead, more than 200 hospitalized persons, and 116,000 evacuated persons during the first weeks of the accident, and about 1.5 million hectares of agricultural lands where  $^{137}\text{Cs}$  density exceeded 5 Ci/sq Km which were put out of production. More or less intensive radioactive pollution spread over the territory with a radius of more than 2,000 Km enveloping about 20 countries, including 131,000 of Sq. Km in the USSR alone. Fourteen regions of Russia, Ukraine and Byelorussia suffered most. At least six more regions suffered less but the largest USSR resort, Sochi, had 900 radioactively polluted small areas (Dergachev, 1991).

The most heavily polluted zone where  $^{239}\text{Pu}$  and  $^{241}\text{Pu}$  density exceeds 0.1 Ci/Sq Km lies mainly within the radius of 10 Km from the nuclear power plant, and it cannot be used for economic activity for centuries. The total number of people living on the radioactively polluted territory where  $^{137}\text{Cs} > 1$  Ci/Sq Km, now is approaching to four million, including 140,000 persons who should leave these areas in 1991-1992. The material costs of the Chernobyl accident according to some estimates would exceed 200 billion rubles by the year 2000 (Koryakin, 1990).

The so called gradual destabilization is no less menacing to  $S_E$  and respectively  $S_3$  systems. It takes place as a result of step-



by-step environmental deterioration by highly toxic or hazardous substances. The negative effects of this process though not so vivid and dramatic as in the previous case, but they display themselves already in a global scale (i.e., green-house effect, ozone layer depletion, etc.), thus hampering the world's environmental security and the  $S_5$  (global security) system in general. But at the national level ( $E_3$ ) this hazard has already been felt most vividly, in particular in the Soviet Union where the ecomedical consequences of environmental pollution are noticeably more serious than say in the USA or UK. For example, according to some estimates these factors are responsible for 1/3 to 1/2 of cancer morbidity in the USSR versus 2 - 5% in the USA (Whelan, 1985).

Like in the case of accidents and disasters, the environmental pollution is caused by highly toxic and hazardous substances released by the industries of both the civilian and military sectors of the national economy through their normal functioning. Analyzing the environmental impact of the latter (i.e., of military enterprises), I should like to take again the nuclear industrial complex in the Southern Urals as a case.

For decades, in the Chelyabinsk region, the "Mayak" enterprise that was the cradle of the first soviet nuclear bomb, has been producing plutonium until recent times and has been releasing highly radioactive wastes directly into the adjacent Techa River and Lake Karachay. These wastes were later buried it into the ground without any treatment. As a result, a vast territory around

this powerful complex has accumulated radioactivity of over 1 billion of curies (according to some calculations more than 1.2 billion), including 120 million of curies in Lake Karachay only that is respectively more than 20 and two times more than the Chernobyl's accident emission volume. Radioactive intensiveness at the River Techa banks now is 26 times higher than in Chernobyl areas.

All this leads to an increase of the region's population morbidity rates. Professor V. A. Shevchenko argues that about 500,000 persons have been exposed to high radiation levels, with nearly 1% of those having chronic radiation sickness. Considering that a great amount of radioactive wastes are concentrated in the surface waters connected with Ob river basin, one may observe an increase of the territory with intensive radioactive pollution extremely hazardous to human's health and expect this situation will transform to an environmental disaster in the nearest decades.

The situation in the Southern Urals is nowhere unique despite its perhaps really tremendous scale. The same processes of gradual  $S_E$  system destabilizing take place at other enterprises and organizations of different profile located in other regions. One may cite an example in Czechoslovakia, where according to the press agency CTK, in 227 places left by soviet troops only 12 did not suffer environmental degradation. The whole area occupied by these troops covers 13,000 hectares of agricultural lands and 6.5 thousand hectares of forests. The Czechs assessed the losses as being 243 million Kr, but the soviet side agreed only to 74.7

million or 28% (Argumenty Y Fauty, 1991).

The situation in Donbass may serve as another example. The burial of wastes from the special factory in Gorlovka unknown to the public and neighboring enterprises officials, was damaged while mining. That has led to poisoning of both soil and underground waters, as well as several hundreds of the miners, including three of them who died (Glotov, 1990; Reshetnikov, 1991).

Industries in the civil sector of the national economy also produce a significant impact on  $S_E$  system due to ineffective technology and management of natural resources exploitation resulting both in its depletion and air, water and soil pollution. Each year the rivers and seas of the Soviet Union receive more than 150 billion  $m^3$  of waste and drainage waters containing 30 million of tons of toxic materials. Poor quality of oil and gas mining technologies provoked the emerging of great hazard to the environment of the Lower Volga and Northern Kaspian regions. The waters of Syr-Darya and Amu-Darya Rivers in Central Asia have been nearly depleted through irrigation and heavily polluted by mineral fertilizers and pesticides. That resulted in loss of the Aral Sea considering its recreational and fish-resource potential as well as in earlier mentioned environmental crisis in the Aral region as a whole. The Draft of the State program for environmental protection and rational use of natural resources in the USSR in 1991-1995 and by the year 2005 argues that ecologically safe threshold in the basins of Kuban, Don, Ural and other rivers is over passed thanks to over-exploitation of water resources (Gosudarstvennaya

Programma, 1990).

More than 100 million of tons of pollutants including hazardous substances are emitted yearly in the air of the USSR. Since recently there can be observed the trend of increasing the rate of extremely high pollution levels surpassing 50 PCT (permissible concentrations threshold) in 16 cities and towns and 10 PCT in more than 100 of them incorporating Volgograd, Donyetsk, Sverdlovsk, Tashkent megapolities. In 15 cities including Nizhniy Novgorod and Leningrad agglomerations high pollution levels has resulted in morbidity increase (Gosudarstvennaya Programma, 1990).

In general there are about 15-20 of regions of the USSR that can be characterized as environmental disaster or crisis areas where more than half of the national population lives in. A respective soviet ecologist professor A. V. Yablokov states that "as a result a rapid increase of morbidity induced by environmental quality deterioration takes place. Every third man in those regions has a cancer and the number of such persons is increasing from year to year and the average life expectancy is 4 to 8 years shorter than in the developed countries of the world" (Yablokov, 1989). As has been already mentioned the gross costs linked with intensifying of environmental destabilizing process in the USSR can be assessed at least as 15% to 17% of the GNP.

Thus even the brief and obviously not exhaustive analysis of environmental situation in the USSR displays the heterogeneity of  $F_E$  factors that hazardously impact human's health and environment per se and destabilizes  $S_3$  and  $E_3$  as a whole. The latter

experiences the pressure not only from  $F_E$ . Increase in morbidity rates and shortening of average life expectancy caused by environmental quality degradation lead to worsening of labor force characteristics. At the same time intensive depletion and deterioration of natural resources undermine the primary sector's potential and consequently hurt the economic security subsystem ( $S_{EC}$ ) of the society or  $E_3$  system. Besides the sharp and negative change in the environment for many nationalities in particular the small ones results in destruction of their habits, customs, traditions, break of community linkages, i.e., disturbance of the holisticness of sociocultural security subsystem ( $S_C$ ). The fate of the Northern peoples of the USSR may serve as a vivid example of this situation.

Considering close connections between  $S_{EC}$  and  $S_C$  subsystems on the one hand and political security subsystem ( $S_P$ ) on the other as well as the growing importance of environmental issues in international relations, i.e., in  $S_3, S_4$  (regional security) and  $S_5$  links, the mentioned processes lead also to destabilizing of the whole system of national security  $S_3$  and  $E_3$  system incorporating it. This confirms once more the necessity and utility of a systems approach to research and development of the national security problem. It can be solved only through protection of all human commons including environmental ones and a Person as the main value.

#### References

1. ARGUMENTY Y FACTY (1991). No. 7. S.3.
2. Baburin, V. L. (1990). Socialno-economicheskaya otzenka opasnykh prirodnich yavleniy. Opasniye prirodniye yavleniya. Ed. C. M. Myagkov. Moskva: Moskovsky Gosudarstvenniy Universitet.
3. Dergachev, A. (1991). Sledi Cherobilya v centre Sochi. Izvestiya. No. 35. 9 Fevralya.
4. Glotov B. (1990). Otkuda "golubaya" voda?. Pravda. 11 Maya.
5. GOSUDARSTVENNAYA PROGRAMMA PO OCHRANYE OKRUZHAYUSCHEY SREDI I RATZIONALNOMU ISPOLZOVANIYU PRIRODNICH RESURSOV SSSR NA 1991-1995 GODI Y NA PERSPEKTIVU DO 2005 GODA. PROEKT. (1990). Pravitelstvenniy Vestnik. No. 40. Ochyabr. S. 5-6.
6. Koryakin Yu.I. (1990). Socialniye aspekti yadernoi energetiki. Energeticheskoye Stroitelstvo. No. 8. S.9.
7. Legasov V.A. (1987). Iz segodnya-v zavtra. Pravda. 5 Ochyabrya.
8. Nikipelov B.V., Romanov G.N., Buldakov L.A., Babaev N.S., and Yu. B. Kholina (1989). Radiatzionnaya avariya na Yuzhnom Urale. Atomnaya Energetika. T.67. No.2. S. pp. 22-30.
9. THE NORTH ATLANTIC TREATY ORGANIZATION (1989). Facts and figures. Brussels: NATO Information Service. P. 386.
10. Otway H. and P. Pahner. (1976). Risk assessment. Futures No.8. pp. 122-134.
11. Otway H., and K. Tomas. (1982). Reflection on risk perception and policy. Risk Analysis Vol. 2. No. 2. pp. 69-82.
12. Porfiriev B. N. (1990). Economicheskiye i organizatzionno-upravlecheskiye problemi ekologicheskoi politiki v SSSR. Izvestiya Akademii nauk SSSR. Ser. ekonomicheskaya. No. 3. S. pp. 22-30.
13. Reshetnikov V. (1991). Neuzheli obyazatelno nuzhni katastrofi? Izvestiya. No. 23. 26 Yanvarya.
14. Shevchenko V.A. (1990). The genetic consequences of the impact of ionising radiation on natural population after Kyshtym and Chernobyl. /Proc. of the Seminar on consequences assessment of the environmental impact of radionucleids released through the major nuclear accidents: Kyshtym, Windscale and Chernobyl. Luxembourg, October 1-5, 1990. International Radiological Union. (Forthcoming).
15. Slovic P., B. Fischhoff, and S. Lichtenstein. (1979). Rating the risks. Environment No. 4. pp. 14-17, 36-39.
16. Slovic P., B. Fischhoff, and S. Lichtenstein. (1980). Facts

and fears: understanding perceived risk. In Societal Risk Assessment: How Safe Is Safe Enough? R. Shwing and R. Albers (eds.) pp. 181-216.

17. Slovic P. (1987). Perception of risk. Science No. 4799. pp. 280-285.

18. Starr C. (1969). Social benefit versus technological risk. Science No. 165. pp. 1232-1238.

19. Sverdklik S. B. (1990). Volny ekonomist protiv vsey korolevskoi rati. ECO. No. 12. pp. 111-118.

20. VERCHOVNIY SOVIET SSSR (1990). Postanovleniye "O edinoy program po likvidatzii posledstviy avarii na chernobylskoi AES i situatzii, svyazannoi s etoi avariyei." 25 Aprelya 1990. Pravda. April 28.

21. Vlek C., and P. Stallen. (1981). Judging risks and benefits in the small and large. Organizational Behavior and Human Performance No. 2. pp. 235-271.

22. Whelan E. (1985). The toxic terror: the truth about the score of cancer. Ottawa (Illinois).

23. Yablokov A. V. (1989). Vistuplenie na I Syiezde narodnich deputatov SSSR. Pravda. 10 Aprelya.