B. DISASTERS AND DEVELOPMENT

5. NATURAL RISKS AND SUSTAINABLE DEVELOPMENT

M. Miagkov

Introduction

A definition of sustainable development is that it involves providing the satisfaction of necessities and the maintenance of stable environment for the present and future generations (Programma Deistvii, 1993). The alternative would be a global ecological, or socioecological catastrophe (SEC) as the consequence of the:

> 1) exhaustion of the world industrial economy due to the depletion of the natural resources available;
> 2) loss in population health due to the contamination of the environment; and,
> 3) degradation of the biosphere under excessive anthropogenic pressure and leading to deep changes in the gas composition of the atmosphere and climate.

According to the appraisals of experts, working with the Club of Rome, the World Watch Institute and other ecological organizations and ecological oriented scholars (Brown et al, 1991, Gorshkov et al, 1994; Meadows et al, 1994), the first two of the causes of SEC could occur worldwide in the second or third quarter of the 21st Century. The third stage could reach an irreversible stage a few decades later.

At the regional level, the degradation of life supporting systems and the degeneration of the population can begin earlier or has already begun. The Chernobyl disaster suggests that SEC can be expanding as a series of natural, technological and ecological emergencies. This idea is confirmed by the fact that in the time frame of the scientific-technological revolution, the economic losses from natural and technological disasters have risen at a rate nearly equal to the square of the world gross product growth rate (WGP). This means that man himself receives the lesser part of WGP and the absolute volume of this part can start to go down even if the WGP will grow as before. Extrapolations show that such a situation can appear by the middle of the 21st Century. The ideas mentioned allow us to conceive the transition to sustainable development as the result of social-ecological risk reduction at an acceptable level, and to consider natural risk as a social-ecological component

Units for Impact Assessment

By the *Rio De Janeiro Declaration*, all nations should be protected from social-ecological risk, and people should have the right to a healthy and fruitful life in harmony with the environment. In the context of this paper it is more expedient to speak about "ethnoses" understood as stable groups of people settled on particular

land areas and possessing their own land-use technologies and traditions or cultures (for details see Narodı Mira, 1988). Ethnos is not a synonym of culture. In a narrow sense, a culture is only one of the attributes of an ethnos while in the broader sense a culture incorporates a group of ethnoses (peoples, etc.) united by researchers on a basis of common attitudes (Weltanschauung), social fabric and structure, technologies, archeological heritage and so forth (see Gumilev, 1990).

Ethnocultural and ethnogenetical diversity is of great value for the human race and an indispensable condition for this sustainability. It would be a mistake to agree with the opinion of some social anthropologists that ethnocultural diversity is something archaic, and has to be replaced now by standardized systems of ideas, responding to a global industrial economy.

From the viewpoint of natural and other types of risk issues, an ethnos can be seen as a population in a territory and having an economic complex with a natural base (TC). The structure and other characteristics of the TC are connected with an economic type (see Table 1).

It is common for TCs with several ethnic groups to have several elementary cells. Also, in "gasoline" based agricultural and industrial economies, there can be more than one ethnos in the TC elementary cell.

Sustainable development of mankind is sustainable development of "ethnoses" (cultures) and is possible as various TC sustainability, that is, the ability of TCs to have endless self-reproduction. The average population life length and its expected changes can be an obvious index of TC conditions and evolution. It is reasonable to aim the TC management, including risk management, at the life length growth.

Natural Risks for Territorial Population and Economic Complexes

One of the factors that is negative to TC sustainability is the impacts of natural hazards. With the complexity of TC structure or land-use technology, as well as TC territorial expansion there will be an obvious rise in the number of encumbering and hazardous natural phenomena for TC (Table 2)

In the same way, there will be a rise in the frequency and severity of disasters. The number of encumbering and hazardous natural processes and phenomena (HNP) in "oil" using agricultural cultures within their present areas, is much higher than exist for organic agriculture in subtropical and tropical lands. Industry has brought along the possibility of catastrophes, triggered by natural forces but with the main striking factor being technological such as in explosions, toxic substance outflows, etc. (Miagkov, 1995).

Table 1

Types of territorial population and economy complexes (Tcs)

Types of economy		Essential TC elements	Elementary cell of TC	Population densit (persons/ sq. km)
Nomadic (hunting, gathering, stock-raising)		Nature lands, sources of raw materials and fuel, temporary habitation	Territory of seasonal migrations of a kin	less than 1
Industrial	manual	The same as above plus fields and permanent settlements	"Village" agricultural settlements with environs	1 - 10
	ploughing	The same as above plus assisting settlements, towns transportation communications	"District" a group of villages with central town	10 - 30
	irrigated	The same as above plus irrigation constructions	"Region" a group of districts coo ratively using irrigation nstructions	up to 700-800
	"gasoline"	The same as above plus production centers, power centers and communications	"State" a group of cooperated dis tricts and regions	50 and more
Post-industrial		The same as above plus information management centers and communications	State or union of states, cities and megacities	10^n

Table 2

Genetic types and kinds of hazardous natural processes and phenomena (HNP) and their impact on economy*

Parameters	1	2	3
Solar-cosmic HNPs			
meteorite hazard	N	N	N,T
magnetic storms, ionosphere holes	-	-	T
polar regime of sunlight	-	-	E
Geodynamic HNPs			
earthquakes	N	N	N,T
volcanic eruptions	N	N	N,T
tsunamis	-	N	N,T
bergshock	-	-	T
Geological and geomorphologic HNPs			
landslides	-	N	N,T
surface ground slipping	-	-	E,T
snow slipping	-	-	T
rockfalls	-	N	N,T
falls and pulsations of glaciers	-	N	N,T
snow and slush avalanches	N	-	N,T
mudflows	N	N	N,T
suspension flows at sea bottom	-	-	T
soil erosion and deflation	N	N	N,T
ravine erosion, thermal erosion	E	N	N,T
reforming of river-beds and canals	-	N	E,T
water reservoirs filling by sediments	-	-	E
sand dune movement	-	E	E
ground subsidence on loess, karst, etc.	-	E	N,T
bad roads condition due slush and dust	-	E	E

Table 2 (continuation)

Parameters	1	2	3
water throws in subsurface works	-	-	T
encumbering local topography	E	E	E
Climatic and hydrological HNPs			
hurricanes, typhoons	N	N	N,T
tornadoes, squalls	N	N	N,T
sea storms	-	-	N
sea ice (compression) and icebergs	-	-	T
irregular sea streams, torrents	-	-	T
abrasion of sea and water reservoir coasts	-	E	N,T
floods	N	N	N,T
submergence and drainage of coastal lowlands	-	-	N,T
droughts, dry winds	N	-	N,T
extreme air temperature and precipitation levels	N	N	N,T
damage by hail	N	N	N,T
lighting shocks	-	-	T
fogs	-	-	T
icing, ice-crusted ground, hoar-frost	-	-	N,T
snowstorms, bad roads condition due to snow drift	E	E	N,T
deformations of perennial frozen ground	-	-	E,T
extreme oscillations of river flow	E	N	N,T
ice phenomena on rivers and lakes	-	-	E
icing of river-beds and slopes	-	-	E,T
bogginess, bogging	E	N	E,T
rise and lowering of ground water levels	-	E	E,T
atmosphere nongomogenity for aviation and space crafts	-	-	T
sharp changes of air temperatures and pressure	-	-	T
Geochemical HNPs			
soil salinization	-	N	N
fire-damp explosions	-	-	T
toxic gas emissions from lakes	N	N	N,T
biochemical corrosion	-	-	T
Biotic HNPs			
epidemics, epizootics, epiphytotics	N	N	N
mass reproduction of pests	N	N	N
mass reproduction of alien species	-	N	N,T
forest, steppe, coal, peat fires	N	N	N,T
venomous, predatory, parasite animals, poisonous plants	E	E	N,T
bio-hindrances to vehicles, aircraft electricity systems, etc	-	-	T

* Columns: 1 - rainfed agriculture; 2 - irrigated agriculture; 3 - "gasoline" agriculture and industry. Indexes: E - perennial encumbrance; N - risk of natural disasters; T - risk of natural and technological disasters

The significance of different HNPs for TC activity hardly depends on the frequency and power of HNPs. Continuous or frequently appearing kinds of HNPs, such as more often than once in 5-10 years, force populations to establish straight protective measures or by another way, to reduce losses down to acceptable levels. Because of the expenditures on measures for protection again this group of HNPs, together with unprevented losses from them, there are rises in urban, communication, construction and exploitation costs, and also increases in the cost price of production, etc.

These indexes are widely considered as economic characteristics of natural conditions and represent "*environmental resistance*" to one or another economic activity type. In Russia, due to this "*environmental resistance*" the costs in differences in urban and road construction and their maintenance, reach three to five times above what they would otherwise be. In the world, the rise in costs is probably of the same magnitude. Economic geography can be understood as the geography of "*environmental resistance*" to TCs of various kinds. In those cases where similar TCs are connected by market forces, the difference in "*environmental resistance*" will effect their competitive ability.

Natural disasters (ND) are provoked by particular kinds of HNPs, the frequency of which is at a particular level. ND dimensions are usually expressed in terms of number of victims and economic damage. The Munich Reinsurance Company has published a list for all the world NDs in 1900-1990, about 400 in all, with losses of no less than ten deaths and/or ten million US dollars in each case (Berz, 1991; World Map, 1987).

Their data shows the following. Floods accounted for about half of the dead. However, there were a significant number of persons who died in droughts, earthquakes and volcanic eruptions. All the rest of HNPs were responsible for less than one percent of those killed The ND number of fatalities due to floods reached 1.5-2 millions (mostly in China and Bangladesh). Droughts (mostly in India) killed between 0.5-1 5 millions, and another 0.1-0.3 died in hurricanes and earthquakes. Seventy-five percent of fatalities resulted from two percent of the largest NDs; and only five percent from the 90 percent of the smaller ones. Only five percent of those killed died in 1900-1990. The average number of dead per one million of population in this period amounted to 33 in the world as a whole, 110-120 in China and Bangladesh, 50-80 in India and the countries on the Pacific coast of Central and South America.

Developed countries had the most economic damage. In the 1980s this was more than one thousand US dollars per year per person. About 30 percent of the world total of economic damages occurred in developing countries, or about ten US dollars per year per person. Ten percent of the most severe NDs in 1920-1990 were responsible for 60 percent of total losses. The largest losses from one type of disaster were up to 15-20 billion (US) dollars for earthquakes. For both droughts and hurricanes the economic losses were 10 billion each, with another two billion from floods The increase in the economic loss growth rate was about nine percent per year In the 1980s this loss equaled 85 billion dollars.

In the former Soviet Union, since 1948 (the year of the Ashkhabad earthquake) the number of dead because of NDs was 15-20 per year for each one million persons in the population. Economic losses in the 1980s were 5-10 billion roubles per year (in the prices prevailing in those years), with losses and expenditures of an additional 30-40 billion roubles due to "*environmental resistance*." These figures mean that specific loss from NDs was close to the world average level, but *"environmental resistance"* costs were about three times than the world average. The most severe NDs of the last 50 years (the Ashkhabad and Spitak earthquakes) occurred in the southern republics of the Soviet Union. In Russia, the economic losses are relatively low, but expenditures on "*environmental resistance*" are relatively high compared to those in the former Soviet Union.

Natural Disasters and Sustainability of Territorial Population and Economic Complexes

Absolute figures for losses are not sufficient for understanding the influence of NDs on the sustainability of TCs. Required are assessments of loss with respect of the ability of the TC for self-rehabilitation and the time span needed for it.

A loss of population excludes the possibility of rehabilitation to the former TC if the remaining ethnos (population) is so small that it is genetically impossible to have a restoration. Population genetics suggests that the minimal numerical requirement is in the hundreds Small "ethnoses" are very vulnerable to ND impacts, while larger ones can withstand the largest possible losses. It can be supposed that in history there have been instances where ethnic TCs in areas prone to severe NDs have been diminished.

A major loss of natural bases such as arable lands or water sources can be ruinous for **TC**. In such cases, which can be designated ecological catastrophes, the victims who survive have to migrate to other lands, where they will ethnically reform to the degree determined by the differences between the old and the new environment. Many historically known "great migrations of people" occur in events initiated by climatic changes (in particular by increases in the frequencies of droughts, frosts or other NDs). Conversely, cultures can become resigned to existing high NDs risks if there is a naturally maintained agricultural base (for example, high soil fertility in volcanic ash deposits in Java, or in the flood plains of the Ganges and Yangtze valleys). Natural disasters in those situations become a part of *"environmental resistance*."

Losses in the production base (i.e., buildings, enterprises, communication, etc.) is most common in ND but they are repairable and cannot ruin TCs. The time span needed for rehabilitation depends on the character and magnitude of losses and can be subdivided as follows:

1. In accordance with losses in the TC population and nature base. It will occur in less han a few years if these losses do not significantly deteriorate the natural resource potential and

the demographic situation (the number and health conditions of the economically active and other groups in the population);

In the opposite case, the time will be more than several years. This will occur if there are significant decreases in productivity and/or changes in the character of the economy (such as the loss of agriculture because of deterioration of the arable land; the possible employment of the partly disabled, etc.)

2. In accordance with economic losses. A common case is that this will take up to a few days; this primarily occurs when a major effect of the ND is a degeneration of communications. Activity in the TP that is dependent on communications, will simply be delayed for a while.

If significant parts of the crop are lost and/or communications and other TC elements are damaged more than in the previous case, the delay will be up to a year. Until the damage is repaired, the necessary materials and energy flows in the TC are maintained by temporary capabilities and communications and also by long-term reserves.

It may take up to five-seven years. This can occur if the damage is so severe that it becomes economically advantageous not just to repair but to modernize the stricken TC elements.

These and other similar considerations can be summarized as the typology of NDs by their severity of impact on TC (see Table 1, as well as typology of technological and ecological emergencies-ES) Using the codes in force in Russia, we classify ecological situations in Table 3. The typology offered allows a definition of TC sustainability. It is seen as the state of the TC insured by special measures that exclude or prevent major and ruinous emergencies (ES-4 and ES-5), and reduce the frequency of the lighter ones (EC-1 and EC-3), so that the losses do not exhaust the TC over the economically foreseeable future.

The intensity of the impacts of HPNs result in ESs of certain degrees of severity. This can be parameterized like is done in the Mercalli Earthquake Scale. A parameterization has been done for the situation in Russia, but is too detailed to present here. However, in Table 3 the scale is simple enough to allow the determination of any past and the foreseeing of ES by expert assessment

Table 3

Types of natural, technological, ecological emergency situations (ES)
by severity of impacts on territorial population
and economy complexes (TC)

ES category	Rehabilitation of TC		Character of losses in TC (the most complicated possible combination)
	possible degree of rehabilitation	time needed for rehabilitation	
ES - 1 Lightest	complete	up to 3 days	Disturbance of some communications and some other objects. Number of victims and magnitude of material losses are insignificant or negligible and for TC almost intangible. Ecological situation keeps normal.
ES - 2 Light	complete	up to 1 year	Partial damage of some communications, settlements, crops, etc. without tangible losin population and material resources of TC. Ecological situation keeps normal.
ES - 3 Middle	complete	up to 5-7 years	Complete damage of some settleme enterprises, communications, crops, etc. possible considerable losses of population and reversible losses of TC natural and material basis. Critical ecological situation or disaster may emerge.
ES - 4 Heavy	partial	more than 5-7 years	Multiple damages, the essential part of which is represented by population and/or material losses, entailing significant produc-ti decrease and /or change in economy structure. Critical ecological situation or disaster
ES -5 Ruinous	within economically reasonable tim rehabilitation of former TC is impossible		Multiple damages, the bulk of which is represented by practically complete loss of population and/or TC material basis, that means the annihilation of TC. Situation of ecological catastrophe or major disaster

In practice, we have to take the self-governing territorial units of a state as the TCs For Russia these are the "subjects of the federation," that is, the republics, territories and regions. In the last 15 years in Russia there has been about 150 natural ESs per year (excluding geochemical and biotic ones, see Table 2). This amounts to about 0.5 to 2.25 for each one million of the population.

The geophysical field of HNPs and the type of economy are factors that effect the frequency of ESs. Under similar natural conditions, industrial regions are more sensitive and feel more ESs than do agricultural ones. Most of the natural ESs fall into the ES-1 category. By paying attention to historical data we can estimate that the number of each ES category is one or two orders lower than that of the previous one.

Among historically known events, the submergence by the Caspian Sea in the 13th Century of parts of the Khazaria State in the lower part of the Volga Basin, falls into the ES-5 category. In the ES-4 and ES-3 categories can be placed some droughts that inspired some nomads in the steppes to migrate, episodic desolation of some agricultural districts in East Europe in the 4th Century, and much later, the 1948 Ashkhabad and the 1988 Spitak earthquakes. The Chernobyl disaster was an ES-5 for the area around where it occurred, and was an ES-4 for the other areas affected.

Many legendary and archeological established NDs that involved the disappearance of ethnoses ("cultures") or migration from their ruins, belong in the ES-5 or the ES-4 categories. Examples would be the fall of the Ubaid culture in Lower Mesopotamia because of a flood 5,500 years ago: The destruction of the Crete-Minoan culture after the Santorini volcanic eruption in the 2nd millennium B.C (one version of "Atlantis"); The impoverishment because of heavy soil erosion in the 7-8th centuries B.C. of hilly regions in Ancient Greece, etc.

Ethnic Culture and Natural Risk

An astounding variety of ethnoses appearing in all continents apart from icy Antarctica, testify to the great ability of mankind to control natural risk. The answer to "*environmental resistance*" was found in a local detailing of long used methods addressing NDs and in the use of one or other measures to lower losses. We generalize this in Table 4. For completeness, measures against technological risk - following ideas of professor V. Legasov (see Legasov, 1987) - are also mentioned in this table. Protection had been introduced almost as soon as HPNs appeared. The beginning of forecasts of meteorological and hydrological hazards connected with the irrigation of agriculture dates no less than four thousand years ago. Antiseismic constructions appeared even earlier, about five thousand years ago. Soon after the appearance of large towns, there appeared about 3,500 years ago, dikes against floods. Special training concerning natural risk in what is now called engineering, geology, hydrotechnical construction and other disciplines, etc. began no later than 3,500-4000 years ago in priestly and secular schools in Ancient Egypt, Assyria, China, etc. Experience in land use was amassed through the centuries.

Table 4

Types of natural, technological, ecological risk control measures for TC

Organization measures		Engineering measures	Technological measures
planned	operative		
(1)	(2)	(3)	(4)
Measures of control of TC exposition to hazardous impacts			
1. General limitation of high -risk regions involvement in economic activities	5. Active elimination of episodically emerging hot-beds of hazards	8. Building of enginee -ring protective const-ructions:	11 Refusal to use technologies and substances:
2. Placing the objects in the areas where risk for/ from these objects is minimal	6. Choosing options of cur-ren activities facilitating mi-nimizati of: 6.1 contacts with hazardous sources	8.1. limiting intensive-ness and magnitude of impact 8.2. serving as shelter in case of emergency	11.1 too hazardous or untested: 11.2 based on use of fast depleting resources
	6.2. impact of hazardous phenomena and processes on communities	9. Using in-built risk proof technologies in a potentially hazardous fa-ci or construction	12. Limitation of temperature, pres-sure levels and vo-lume of toxic subs-tances used
			13. Recycling and isolation of hazar-dous wastes
Measures of control of TC vulnerability to hazardous impacts			
3 Elimination of potentially high-risk facilities from TC	7. Decreasing disaster los-ses within TC through opti-mal performance of prepa-ratory rescue and repair works including:	10. Use of special con-struction design for buil-dings, machinery, etc., functioning in hazardous environment:	14. Adjusting tech-nologies to stable working in extreme conditions and sea-sonal fluctuations of production
4. Duplication of key TC ele-ments. Reservation of lands and other natural resources considering possible need for refugees relocation from areas of severe disaster	7.1 organization and deve-lopment of special emergen-cy warning	10.1. strengthening of frames and/or casings	
	7.2 maintenance of emer-gency materiel and medical support facilities and reser-ves 7.3. organization and deve-lopment of life and property insurance services	10.2 providing multiple redundancy for key con-struction and technologi-cal elements 10 3 using special co-nstruction materials 10.4. using easy-to-re-pair constructions	

The most ancient myths contain mention of HNPs and NDs. The most ancient records of memories belong probably to Australian aborigines who for 30 to 50 thousand years have repeated stories about earthquakes, volcanic eruptions, and tsunami disasters experienced by their ancestors during migration from Asia southward through the Sound Archipelago. The topics of folklore however do not confirm current opinion that ancient cultures were bullied by hazards and played the role of pitiful boys in the arms of nature.

As to cases where ethnoses were ruined by ND (those in categories ES-5 and ES-4), they can be explained by the deficiency in the experience of the involved populations. We can divide them into three kinds.

1. The appearance of natural situations that have no analogies from the cultural past. In such unusual situations an ethnos can disappear due to migration. Apparently this factor explains the rather slow - at the rate of a few kilometers per year--movement in the Americas from Alaska to Terra-del-Fuego, or expansion of agriculture in Eurasia. The other version of this kind of factor would be the appearance of extraordinary natural event on an already inhabited place;

2. A marked increase in natural risk as a consequence of the introduction of new land use technology. An example would be the "fall" of Babylon because of soil salinization that was reinforced in the 6th Century B.C. by using alien Egyptian irrigation technology.

3. An inability of an ethnos to undertake reasonable risk perception because of some peculiarities in the cultural outlook. The historical examples of the "fall" of ethnoses by this cause are debatable, and we shall not dwell upon them. Much more important is that the present growth of the number and dimensions of NDs as well as the appearance of the SEC threat itself are connected with a crisis in risk perception. Therefore, let us look in more detail at risk perception issues.

Ethnocultural Peculiarities of Risk Perception

Studies by psychologists (Kotik, 1987 and others) have established that practically every person, given their action goals, tends to undervalue risk. This underevaluation is based on shortsightedness of apprehension, i.e., on a sharp exaggeration of the importance of near events compared with distant ones, especially if the first is desirable and the second one is not. A disregard of individual risk was a detail of behavior, biosocially necessary for Cro-Magnon hunters, and inherited until now.

At the level of an ethnos that aims at immortality, the disregard of risk by individuals is balanced by the birth rate and by ethics in the care of members of the same group, other ethnoses and the natural environment. According to Gumilev, Spengler and others (see Gumilev, 1990; Spengler, 1993), the ethics of ethnoses develop from their particular, inborn outlook (that is, understanding of the world), or "presymbols," as well as from amassed experience, including ecological ones. An ethnocultural elite is the bearer of the outlook, experiences and ethics. It embodies the culture as a unity from the past and into

future generations on their native land and is reproduced by a number of gifted persons in a matter of fact, life lasting spiritual upbringing and education (for example, it took Pyphagor 22 years to obtain initiation from Memphis priests). The wisdom of the elite includes foresight of risk perception and is able to bring the ethnos to sustainability, to prevent overcrowding and destruction of its native environment.

There were and are many examples of such cultural evolution when and where Western economics did not affect the life style of other ethnoses. We use the name of the West here to designate a group of western European and related cultures that came into being about a thousand years ago. It presented an image of the world as "endless space demanding to be conquered," and "created its own poetry of power, unrestrained will, passion to overcome and crush opposition" (Spengler, 1993: 261). From this presymbolism easily developed unique Western ideas such as the opposition of man to nature for the purposes of dominating it; understanding of material production as the main measure of the development of mankind; liberal-market systems of individual behavior motives; belief in the omnipotence and endlessness of scientific-technological progress, and in the right of the West to lead the world.

The mother ethnoses for the West did not have enough wise and influential cultural elites to warn their "newborn" against hazardous delusions "Positivistic science" took the place in the West of an ethnocultural elite, and it serves only as an instrument for the "conquest of space" and for the creation of social-ecological problems.

We should note that all these peculiarities of Western outlook and behavior formed spontaneously, and were not the result of anyone's malicious intent. Yet they signify that the West is irremediably short-sighted and cannot make sustainable its technology of land use. The West just cannot realize the threat of SEC. That is why SEC is inevitable.

We can illustrate the differences in the perception of risk by various cultures by comparing losses due to NDs and to traffic accidents in Japan, Western Europe (Great Britain, France and Germany), as well as in the United States (see Table 5 based on data from the Munich Reinsurance Company and other sources). These countries have approximately identical industrial development levels, close demographic and economic indices, but they are different in their ethnic psychology.

The United States is the country where Western motives and ideas of behavior are present in their most extreme form. Japanese culture belongs to the Eastern type, which distinguishes itself by such ethnopsychological features as emphasis on the collectivity, respect for traditions, aspirations to adhere to the experience of ancestors, etc. The specific number of NDs is largest in Japan (this results from its geographic situation), but specific losses from NDs and also from traffic accidents are easily the smallest in that country (which also depends on risk perception). It is easy to calculate from table 5 data, that with the attention of Japanese to risk, the specific ND losses in Western Europe would be one order lower and in the United States two orders lower than they actually are.

Table 5

Comparative pattern of natural and technological hazards
in Western Europe, USA and Japan*

Indicator	Japan	Western Europe	USA
Population density	1	0.52	0.0
Gross national product (GNP) per area unit (sq. km)	1	0.39	0.0
Number of natural disasters (ND) in 1960-1990 per area unit (sq. km)	1	0.55	0.2
Number of ND fatalities in 1960-1990 per 1 million of population	1	1.8	7.7
Direct economic losses due to ND in 1960-1990 per GNP	1	4.1	8.0
Number of dead due railroad accidents in 1980s per 1 passenger-km	1	19	130

* Values of respective indicators for Western Europe and USA are presented in relative units comparing with Japan. Those for Japan are considered as equal to 1.

Therefore, we can suppose that for every land-use type the geography of natural risk (i.e , probable loss tolls and severity) is more the geography of ethnic cultures than the geography of HNDs.

The influence of land-use types of nonwestern ethnoses on their attention to natural risk can be found by an analysis of folklore personal behavior motivations. It turns out that attention to risk rises along with TC complexity (see Table 1), or with the complexity of protective strategies. These can involve a simple withdrawal form hazardous zones, which is practical for hunters-gatherers, to the use of multi form operative and permanent measures of risk prevention by ethnoses that undertake irrigated agriculture. The involvement of ethnoses in western type market economies lower their attention to risk. Westernized administrators are replacing traditional cultural elites. Previous sustainable land-use technologies are losing out. SEC will outlive these ethnoses, for whatever the cultural losses they are not irreversible (possibly Japan will be in this category). On the contrary, the first to get into SEC will be those ethnoses where the westernization of the economy is especially fast, deep and destructive for traditional life styles. One can suppose these countries are now marked by relatively high rates in the increase of HDs.

he Russian culture differs from other agricultural ones by its high disregard for natural risk. These differences are rooted in the inbred character and history of Russians. "It appears to a Russian that he can do everything, which is why he is not afraid to do anything" (L. Shestov, cited after Bessonov, 1993: 155). Russians look upon the world as an order that can be improved so that it will become the Kingdom of God, and hence they do not have too much respect for traditions.

There is always in Russia to find a better fate or to escape from conquerors, the possible migration of people into new lands (TCs). Attention to risk began to decrease along with the industrialization of the country and with the westernization of the outlook of managers. Moreover, an economic depression in the 1990s has brought into being a unique situation in which natural and other risks problems are almost totally excluded from the attention of administrators and the electorate. That is why the frequency of various ESs now rises about 20-30 percent a per year. The probability of severe ESs is also growing.

If there is not an actual start of SEC, these destructive social and economic processes feed each other, and can be taken as a model for social ecological catastrophe. Russia's fate depends on the possibility of real ethnocultural elite survival and the restoration of authority.

Conclusion

Natural (as well as other) risk management is a part of land-use mechanism, cultivated by experience. History convinces us that enthocultural experience can successfully insure sustainability of development (or existence) of various territorial populations and economic complexes

At present, natural risk rises due to the westernization of the world economy and is partly a threat of a social-ecological catastrophe. From an ethnohistorical point of view, these processes are not fatal for the world as a whole. On the contrary, the common Western understanding of history as worldwide technical progress, does not leave hope for the survival of mankind.

A transition or return to sustainable development is an ethnocultural problem, and not one of a scientific-technological character. A period of SEC in the middle of the 21st Century will outlive ethnoses, except those who try their own ethical land-use. In those cases, monitoring of and studying spatial pattern of natural disasters over the globe will make it possible to foresee the emergence of SEC areas.

Acknowledgments

This article is part of a study started with the support of the Russian Fundamental Research Foundation. The author really appreciates the invaluable help of Professors B. N. Porfiriev (Russia) and E.L. Quarantelli (USA) in editing a draft version of this paper.

6. THE SOCIOLOGY OF SECURE LIFE ACTIVITIES

V V Kafidov and N. N. Brushlinskiy

Human society, throughout its development, has had to constantly insure its security However, the safety or security needed by every individual has not always been treated as a social need, certainly as much as the same need for the state The community insures its collective security itself, even when the collective institutes are institutions of the state. On the other hand, the necessity for social security or social protection has not always been appreciated by separate individuals.

Security is a state or condition in which the life and the vitally important interests of the individual, society and the state are not threatened by any internal or external danger. Security means either the absence of the very source of danger or risk, or guaranteed protection from it. The degree of acceptability of risk is set by people for themselves, and stems from their psychology of perceiving danger, or because of their understanding of the achievements of science and its knowledge of the surrounding world (Porfiriev, 1991a).

A system of security is created to insure security (Porfiriev, 1991a, 1991b). Various aspects that can be classified as economic, psychological, technical aspects, etc. have been studied. Most of these studies have been mostly of a technical nature. Yet all this research inevitably runs up against blank spots in the study of the social, and more narrowly, the sociological aspects. Most often scientists in various other countries study the sociological aspects of catastrophes.

We can regard P. A. Sorokin as one of the founders of the sociology of catastrophes. In his book, "Man and Society in Calamity" he investigated the main changes that occur because of catastrophes in social structure and social mobility, ethics and religion, as well as science and the fine arts This author contends that "the sociology of catastrophes becomes a common sociology, as well as an inductive philosophy of history" (Sorokin, 1993).

It was A. I. Prigozhin (1989) in present-day Russia who noted the need for a sociological comprehension of catastrophes. On the one hand, he believes it is necessary to take into account the social preconditions and sources of danger, and on the other hand, of the aggravating circumstances and aftermath of catastrophes.

Scientists in recent years ever more frequently and with growing persistence speak of their search for the subject of the sociological theory of risk (Nikitin and Feofanov, 1992), and of the need to study the attitudes of the population toward various types of danger (Dubrovskaja, 1992; Tarasenko and Poliakov, 1992; Kuzminskaja, 1993). The problem of security is studied in all the above listed works. They treat security or safety as a component part of the quality of life, as a way of life.

For this reason we can and must speak of the sociology of security. In fact, the sociology of security makes it possible to identify the regularities in the formation, reproduction and manifestations of attitudes toward security-related matters by individuals and social communities.

From this standpoint, the sociology of security encompasses all the sociological aspects of "riskology" and the theory of catastrophes. This is the more so because the terms "danger" and "risk" are interconnected, while a catastrophe is a result of a violation of the state of security. However, it is true that vital interests may be violated even without a catastrophe.

The sociology of security has not yet taken the form of a scientific theory. Yet if we consider the distinctive features of a sociological theory of the middle range as formulated by Merton (see Pokrovskiy, 1992), it is expedient to first work out sociological theories for separate types of security.

Such an attempt has been made with respect to fire safety. That sociological study centered on a system for insuring fire safety (SIFS), and its environment and internal social organization. This system interacts with all elements of the economic complexes so the country is called upon to take an active part while insuring its stable functioning and the safety of work processes and habitat, which is continuously changing and becoming more sophisticated under the influence of the progress of science and technology.

It is the socioeconomic role of SIFS to prevent the deaths and injuries of people. It is also to spare society for the need of additional production, that is, production on a bigger scale than required for the simple replacement and reproduction of the existing wealth. The system will allow available reserve means of production to cope with the consequences of calamities caused by accidents or the forces of nature.

Through its socioeconomic nature, a system for insuring fire safety cannot directly prevent the death of people or reduce the number of fires and the damage caused by them. It merely creates the conditions for reducing their scope and affects them indirectly (this is a characteristic of many other security systems as well). The death of people during fires, in many instances, depends not on the functioning of the system but, for example, on the overall cultural standards of the population.

We can compare the sector for insuring fire safety with the sectors that make up the infrastructure of the country's economy. The infrastructure is made up by the system of institutions and organizations that insure the optimization of social development. This expresses itself in the creation of a set of conditions for the effective development of production and the life of the society.

It is an important specific feature of the functioning of SIFS that the services provided are paid for not immediately after they are provided, but in accordance with the average costs of production, circulation and maintenance. This means that the outlay on the maintenance of SIFS should not be reduced to the minimum, but should be in accord with the growing requirements of the economy. As with all sectors of the infrastructure, when an assessment of the economic efficacy of capital investments in SIFS is made, it then becomes imperative to take into account its contribution to the end economic result.

Such a social innovation as SIFS makes it possible to unite the scattered elements involved in insuring the fire safety of the country. The method for managing such a system is close to the specific program-oriented methods of management. This approach makes it possible to explain the inclusion into SIFS as subsystems, of bodies or organizations of state administration, ministries, agencies, scientific institutions, etc. brought together by a common aim and program in which each participant has his place, functions, and rights and duties. The coordinating role in such an arrangement is given to the fire service and its administrative bodies.

An all-around analysis of the system for insuring fire safety confirms the conclusion that it can be regarded as a social institution.

The main features of this social institution are outlined in works devoted to structural and functional analysis and social management. We can regard the institution as an established social practice based on legislation, while we can also view institutionalization as a process through which any assortment of social actions, including the introduction of an individual into an organization, becomes an institution.

The institutional approach makes it possible to view the sociology of fire safety as a special sociological theory. Here the main questions for theoretical and empirical sociological studies are:

- fire safety as a component part of the quality of life;
- the protection of the population from fires;
- the influence of the environment on the system for insuring fire safety (e.g., climate, locality of habitat, religion, the nature of the urban layout and housing, culture, traditions, etc.);
- the amount of information about fires given to the population;
- the extent to which the population is prepared to take fire precautions and to respond in case of a fire;
- the attitude of various social groups to the problem of insuring fire safety and safe behavior; and public opinion on the problem of fires and activities to insure fire safety.

The prime function of SIFS as a social institution is to maintain a high level of fire safety in the country Safety from fires, as a need for society, communities and

individuals, is insured because of established (institutionalized) social roles, standards and sanctions, as well as moral norms and values that are part of the culture of the given society.

The standards of behavior required by SIFS quite often conflict with the accepted culture regarding behavior in society To resolve these contradictions use can be made of stimulating and censuring juridical and economic sanctions, or as Sorokin (Sorokin, 1992) describes them, punishments and rewards.

Fire safety standards and rules are, in the main, technical ones but since the activity or inactivity of people insure their existence, this imparts a social character to them. For inappropriate behavior, SIFS provides censuring sanctions. We regret to note that at the present stage of development of Russian society, no provisions have been made for sanctions of an economic nature (or they are barely provided for). Legislation should place entrepreneurs in such a position that it would become simply unprofitable for them to ignore questions of labor protection and safety.

The sociological theory of fire safety studies the sociocultural regularities governing the understanding by various social groups for the need of fire safety and safe behavior. The sociology of fire safety finds out and evaluates the system of interconnections between SIFS and the social environment. It also studies methods for influencing the system of values and standards, both of individuals who belong to various social communities, and society as a whole.

It is traditional for sociologists to study the development of relationships between social phenomena and the state of the habitat. In sociology there has been the development of views regarding the importance of geographical, biological and other factors (Tchagin, 1978). Historians insist that the human habitat explain the specificity of the development of civilizations, cultures and even of "world economies" (Brodel, 1992).

Psychologists actively discuss the problems of the interconnection between security and the natural environment (Dushkov, 1987; Kotik, 1987; Tchernoushek, 1989; Sergeev and Pegov, 1992). However, there is little knowledge of the influence of socioeconomic factors on security (see, Nikitin and Feofanov, 1992; Dubrovskaja, 1992; Tarasenko and Poliakov, 1992). Such kinds of studies have traditionally interested lawyers and ecologists (see Osipov, Kovalenko and Schipakov, 1990; Shell, 1992). At the same time there are hardly any studies about the influence exerted on the circumstances of fire safety by geographic factors, specificity of settlement and the nature of settlements, climatological, national, ethnographic, demographic and other factors.

Looking very far back into human history, we can say that it is possible that fires and catastrophes have played a progressive, creative and educational role. There is no denying that fires have influenced and changed the appearance of cities. People have

had to change their customary ways of life, and without any clear sign of happiness in doing so, to switch from wooden "healthy" houses, to stone ones. This was a forced measure, as also was the regulation regarding gaps for fire protection between buildings and the zoning of cities. We have good reason to say that fires have directly affected the history of such cities as Moscow and St Petersburg. The same can be said also of many other major cities in the world (Brushlinsky, Kafidov and Kozlatchkov, 1978).

Fires prompted inventors to create machinery (e.g., the Ktezibius pump, the extendible fire ladder), substances (the Laurent foam), and materials that were not only important for insuring fire safety, but additionally had various household and industrial applications. The danger of fires also compelled people to merge their efforts. Voluntary fire brigades in the countryside became not only centers for collective security, but also centers for cultural life. Sports clubs, drama societies, orchestras, women and youth political organizations are known to have been formed on the model of fire fighting detachments (Foster, 1983).

Whatever the attitude of the population and the state authorities toward firefighters and fire safety, at some given point of history or in a specific locality, the requirement for fire safety is consciously and subconsciously satisfied at a level meaningful and possible to that society. The satisfaction of social requirements in fire safety and the ways these needs are met serve as characteristics of the way of life, and the quality and standard of life.

The influence of the way of life on the state or condition of fire safety is substantially manifested in differing urban and rural ways of life. The process of urbanization steadily draws human beings away from their natural habitat, replacing it with an artificial one. The types of activity and the behaviors of city dwellers change accordingly. City dwellers must have confidence in all of the workers and organizations that design, build and service houses or apartments, manufacture instruments and equipment, and, in case of need, are ready to come to their assistance.

Therefore a sense of personal security depends on trusting those who insure security and on one's own readiness to observe all rules and instructions. City dwellers are not prepared to organize themselves to fight fires and are not capable of coping with them without the help of professionally organized firefighting services (Brushlinsky, Kafidov and Kozlatchkov, 1978).

The way of life of a rural dweller is connected with nature, with natural types of dangers, and community forms for struggling against any danger. In such situations, professional fire brigades are not effective

An analysis of the above sociological and socioeconomic categories allows us to conclude that SIFS facilities raise the quality of life and exert an influence on the way

of life. At the same time, fire safety, the principles, aims and conditions of functioning of the SIFS depend on the way of life. For this reason, it is important for the sociology of fire safety to learn the laws governing the development of SIFS that are in line with changes in the life standards of the country.

The analysis we have conducted leads to the conclusion that a society that does not have a developed culture, or is in transition to new cultural values and standards, is not capable of orienting itself to remote rewards or punishments that, in effect, is the result of measures taken to insure fire safety. Such a society is responsive only to power and quick stimuli.

At the same time, to create a motivation for safe behavior, there is a need for lengthy, painstaking and coordinated work by all elements of SIFS. It is only then that the full possibility will appear of using the idea of socioethical marketing which puts to the fore the interests of concrete users of the services of SIFS and not just abstract public interests.

In recent years, some Russian scientists (see Rosha, 1993) have begun to talk about such an approach to the work of organizations in the Interior Ministry since many fire departments of the country are subordinated to them. This approach is possible only in a society with a developed democracy and a stable economy. At the present stage of the development of SIFS in Russia, it is impossible to discard the existing system of regulations and sanctions, but it should be supplemented by new methods reflecting the level and rates of development of the society.

According to the requirements outline above, these measures to insure fire safety should be designed to produce both a long-term and an immediate effect. The profit or loss incurred should be sufficiently large to encourage "required" behavior with respect to following or not following fire safety instructions and prescriptions. The instructions and regulations should be not only reasonable ones from the viewpoint of those who draft them, but also understandable by those who fulfill them. For this purpose they should be well known and explained, and instilled in the consciousness of those whom they concern. It is also expedient, to use an expression of Sorokin, to use the "educational" effect of sanctions.

Measures to insure fire safety should be dynamic ones. The development of society and the acceptance by the majority of members of this society of its values and standards should lead to a predominant use of "rewards." There should be an appropriately lesser use of "punishments." This indicates the need for corresponding changes in the structure and methods of management of SIFS. At such a level of the development of a society, it is first of all entrepreneurs and officials who should understand the need of additional efforts and outlays so as to receive additional economic and social gains through enhanced security

The fire service protects the lives and property of citizens. Consequently, it should have the full trust of the population. Fire personnel, on the other hand, should have an impeccable reputation and serve as a model for others. The extent of this trust could be constantly monitored by conducting special population surveys.

Sociological studies should determine how social consciousness and public opinion assess the state of fire safety and the performance of the fire service. This will make it possible to create attractiveness for employment in the fire service, to lobby in legislatures for programs to further enhance fire safety, and to shape a positive attitude in citizens to comply with fire safety standards and regulations.

The sociological theory of fire safety may be treated as a derivative of the sociology of organization, in this particular case oriented on insuring fire safety. In its turn the sociology of fire safety should be viewed as a branch of sociology of secure life activity while the latter in the broadest perspective is about sociological theory and practice. That explains the fact that the theory of fire safety has much in common and close links with a number of well known sociological disciplines like:

a) sociology of labor;
b) sociology of organization;
c) sociology of administration and management;
d) sociology of communication;
e) sociology of personality;
f) sociology of mode of life;
g) sociology of behavior (including deviant behavior);
h) sociology of city and village; as well as with social planning.

The sociology of fire safety studies:

- the motives for the voluntary participation of citizens in activities to insure fire safety and related matters;
- the system of professional orientation in the fire, emergency and rescue services;
- the expediency and specificity of employing women in the fire service;
- the social and economic aspects of changes in the work-and-rest regime of firefighters;
- the socioeconomic factors influencing job satisfaction and smaller turnover in personnel;
- the social development of collectivities of fire personnel;
- the formation and development of the personality of firefighters;
- the attitudinal, educational and cultural training of fire service specialists and administrators to enable them to better understand the role and significance of their profession in the world of today;
- the influence of the style and method of management on the formation of stable collectivities;

- the dissemination of information about fire safety and the mechanism of its impact and socioeconomic efficacy.

The sociology of fire safety has only just begun to develop in Russia (in the last 10-15 years). Although only the groundwork of this direction in science has yet been laid (see Brushlinsky , Kafidov and Kozlatchkov, 1978; Kafidov, 1983), it already evident today that the ideas that have been formulated and the regularities that have been identified are of a more general nature. Meanwhile, in the United States and a number of other countries, the sociology of catastrophes is being developed with considerable effort. Taking this into account, it is possible and necessary to create a sociological theory of the middle range, a sociology of secure life activities.