

# **Conflicts and Environmental Change: Models and Methods**

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This chapter is devoted to the urgent problem of forecasting conflicts on the basis of economics and mathematical models. A new approach is proposed for research on existing and potential international conflicts at the global and local levels, based on economic, social, demographic, environmental, and political factors of instability. At the global level, the analysis is based on major features of the main civilizations and on indicators of environmental tension, particularly in the relations between West European (Mediterranean) and Islamic (Arab) civilizations; Islamic (Turkic) and Eastern Christian civilizations; and Eastern Christian countries and the People's Republic of China. A method is described for predicting conflicts on the basis of estimation, modeling, and comparison of military capital. At the local level, characteristics are given of the local conflicts in the Commonwealth of Independent States (CIS) and the model of dynamics and procedure for settling armed conflicts with the help of a regional leader. The results, which are based on economic data, permit a deeper understanding of geopolitical and environmental processes. On this basis we develop recommendations aimed at preventing conflicts.

## **1. Conflicts at the Global and Local Levels**

The study of existing and potential international conflicts at both global and local levels should be based on economic, social, political, and environmental factors of instability.

The main prerequisites for such a study at the global level are the following:

- analysis and forecast of the development of the main civilizations;
- construction of a system of indicators adequately reflecting the economic, social, environmental, political, military, ethnic, and religious distinctions between civilizations;

- analysis of selected indicators and construction of appropriate mathematical models to evaluate the possible escalation of instability and the emergence of conflicts on the global level; and
- identification of regions (especially on the borders of civilizations) where local conflicts are probable.

At the local level the following problems have to be considered:

- analysis of the exogenous and endogenous factors that promote instability;
- development of adequate mathematical models for better understanding of the dynamics and scale of processes under conditions of instability; and
- analysis, modeling, and forecasting of the conflicts given the various initial preconditions for better understanding the processes and for developing more precise measures to increase stability in the region under consideration.

## **2. Stability at the Global Level**

### **2.1 The Main Civilizations**

Huntington (1993a, 1993b) outlines eight major civilizations and suggests that the principal conflicts of global politics will occur between nations and groups of different civilizations, though the nation-states will remain the most powerful actors in world affairs. The eight civilizations are the Western, Confucian, Japanese, Islamic, Hindu, Slavic-Orthodox, Latin American, and African. Western civilization includes European and North American subcivilizations, while the Islamic civilization includes Arab, Turkic and Malay subcivilizations.

The clash of civilizations occurs first at the micro-level in the form of local conflicts induced mainly by religious and ethnic factors in boundary regions, with the aim of establishing control over the territory. At the macro-level, conflicts between states from different civilizations occur over military and economic power and, accordingly, realization of a certain policy and the promotion of one's own religion or ideology. No less than 70% of the large wars over the last five hundred years have been interstate wars. However, since the Second World War most wars have had an ethnic or national basis. Environmental factors are also becoming important.

Huntington's approach has mobilized many critics. We agree with Rubenstein & Crocker (1994, p. 128) that 'destructive conflict between identity groups ... can be averted and can be resolved', and that Huntington's call for the global defense of Western civilization from other ones is not the best idea. At the same time, his prediction of possible conflicts between civilizations can be tested with the help of economics and mathematical models. If it turns out to be possible to determine a group of indicators which predict tension in the relations between civilizations, we may also be able to avert it.

## 2.2 Assessing Global Stability

The indicators should include economic, social, cultural, political, military, and environmental factors (Varshavsky & Varshavsky, 1995):

- *macroeconomic indicators* – GDP rates of change, total consumption of energy, consumption of energy relative to GDP and to the volume of production of the most important products, GDP per capita, consumption of energy per capita, structure of GDP, share of high technologies, etc.
- *environmental indicators* – present and projected population data, rates of their change, volume of migration, etc.; total area, agricultural or arable area, meadows and pastures, index of productivity of land; strategic natural resources (first and foremost the estimated proven reserves of oil and gas, but also rare metals etc.), water resources, etc.
- *indicators of military potential* – defense budget, military burden relative to GDP, military spending per capita, total active manpower, weapons by kind, cumulative military expenditure, etc.
- *ethnic and religious characteristics* – joint analysis of neighboring civilizations with regard to stability at the global level as well as local conflicts on the civilizational borders; a special analysis of the following pairs: Islamic (Arab countries) vs. Western (European Mediterranean countries), Islamic (Turkic states) vs. Eastern Christian, and Eastern Christian vs. Confucian (China).

## 2.3 Environmental Tension and Relations between Civilizations

### 2.3.1 West European vs. Islamic Civilizations

The Mediterranean countries represent two subcultures of the Islamic and West European civilizations - Arab and South European (Greek-Latin). The collision of the Arab and Western countries has a centuries-old history. At present the West depends on the oil of Arab countries. The richest Arab countries have reached an economic level which requires an adequate political system. However, a negative attitude toward the Western model of development and toward the values of Judaism and Christianity is common among them (Titorenko, 1995). The movement in the direction of Western democracy strengthens the anti-Western mood and promotes the growth of fundamentalism. A new political system for the Arab countries must correspond to their system of values if this kind of backlash is to be avoided.

Environmental problems come on top of the political ones. Fast population growth, especially in North Africa, promotes migration to Western Europe and causes a negative reaction there. These countries have also experienced significant growth of military expenditure since 1980.

The data in the following paragraphs come mainly from the World Bank (1991), IMF (1994), UN (1995), US Bureau of the Census (1994), and *World Defense Almanac* (1993/1994). The average annual growth rate of population in Arab countries is 2.7% in the 1990s (8.4 times higher than in the European Mediterranean) and will be about 2.1% (18 times higher) in the first quarter of the 21st century. The population of the Arab countries will grow from 214 million in 1989 to 291 million in 2000 and to 494 million in 2025. Thus, their population will exceed the population of the European Mediterranean countries by a factor of 1.4 in 2000 and 2.3 in 2025.

Population density is an indicator of possible tension. In 1989 it was approximately the same for both civilizations (336 persons per km<sup>2</sup> of arable land for Arab countries and 331 persons for European countries); by 2000 the Arab level will exceed the European by almost 40%. Obviously, the land cannot be improved very fast given the low income per capita, though Arab countries have abundant petroleum and gas. Therefore, a sharply increasing motive to emigrate from Arab countries should be expected as a result of the aggravating demographic situation.

A second important indicator of possible instability in the region is the high level of military expenditure per capita. In spite of decreasing total military expenditures at the beginning of the 1990s, some Arab countries (notably Saudi Arabia, Egypt and Syria) continue to be the leading importers. Arab countries import weapons mainly from the USA and European countries; since the end of the Cold War, Russia's share has decreased drastically (Varshavsky & Varshavsky, 1995).

### **2.3.2 Islamic vs. Eastern Christian Civilizations**

The clash of interests between Turkey and Eastern Christian countries (Slavic-Orthodox and others), such as Russia, Ukraine, Belarus, Armenia, Georgia, Bulgaria, Yugoslavia, Greece, and Romania, represents a very serious problem. Turkey has insignificant power resources, in contrast to the Turkic states of the CIS. In 1989 the Turkey's GDP was 38% less than the total GDP of the Turkic states of the CIS. While Turkey has about the same population as these states, its oil production at the end of the 1980s was only 5% of their level of production, oil processing 48%, electric power generation 26%, and electric power per capita 25% (Varshavsky, 1993; Varshavsky & Varshavsky, 1995).

Turkey's attempts to participate in the production and development of the rich natural resources of the Turkic states of the CIS and to exclude Russian companies from this process are supported mainly by the USA and Great Britain. The role of Turkey is exaggerated by

Western politicians, who consider it a key in transition from a bipolar to a multipolar world. Their policy leads to instability in the region (due to a collision of interests of Russian and foreign corporations) and creates difficulties for settling local conflicts in Nagorno-Karabakh, Ossetia, Abkhazia, Chechnya, and other areas.

The situation is complicated by the growing military power of Turkey (Varshavsky, 1993), which had the highest growth of military expenditure among the NATO countries in the late 1980s and early 1990s (*S/PRI Yearbook*, 1995). The armed forces of Turkey are second only to those of the USA. This is a powerful factor of instability on the southern flank of Russia.

The growth of fundamentalist feeling since 1995 has been stimulated by the direct copying of the Western economic development, as well as by increasing differences between the developed western and backward eastern regions of the country. This is especially dangerous because victory for fundamentalists in one of the Arab countries (such as Algeria or Egypt) may lead to the emergence of an Islamic empire all the way to Afghanistan and Pakistan and influencing the Turkic countries of the CIS and parts of Russia (Titorenko, 1995).

### **2.3.3 Eastern Christian Countries vs. China**

The economic and political crisis in Russia and in the other countries of the CIS and the fast economic growth in the People's Republic of China following its economic reform are likely to lead to significant changes in the power relations between these countries. China grew faster than any other country in the past decade. Many signs point to the strengthening of good neighborly relations between these countries. For instance, Russia has proposed the creation of a system of joint security in the Asia-Pacific region. At the same time, significantly increased instability is also possible. To a certain degree it is bolstered by Chinese statements to the effect that 'the struggle to establish the "new world order" is a competition between states for the better positions, as the old world architectonics is being replaced by a new one' (Miasnikov, 1994, p. 20).

In 1993 China produced 6 times as much coal, 3 times as much iron ore, 1.5 times as much steel, and 7 times as much cement as Russia, though production of electricity lagged behind by 12% and oil by 2.3 times. The total area of China is almost 1.8 times smaller than that of Russia, so the industrial burden on the environment is particularly high in China (Varshavsky & Varshavsky, 1995).

As early as 1992 China's GDP exceeded Russia's GDP of 1990. By our estimates China's GDP may now exceed the total 1990 GDP of Russia, Ukraine, and Belarus. Because of sharp recession in the former republics of the USSR, China's GDP has already surpassed the current total GDP of Russia, Ukraine, and Belarus.

Fast economic growth in China - on average, 7.3% annually in the period 1988-92 - gives Chinese political scientists the basis for thinking that the USA and China are becoming key actors in international relations. Hence, some experts feel that the new strength of China will increase political tension in the Asia-Pacific region instead of decreasing it (Roy, 1993).

The average annual population growth rate in China in 1989-2000 is expected to be more than seven times that of Russia. Population density will grow in China, and so will the pressure on the land. However, land productivity is considerably higher in China, particularly in the southern provinces (Varshavsky & Varshavsky, 1995). There will also be an increasing disproportion between the male and the female population; the number of unmarried men for whom there will not be brides will reach 70 million by 2000 (*Trud*, 1995). A significant part of the Chinese population (180 million) is illiterate or semi-literate, and more than 37% have only primary education. The latent unemployment has already reached 15% in the cities and 30% in agricultural districts (Guelbras, 1995). Under these conditions mass migration from China will create huge problems for any neighboring state (Nakasone et al., 1993).

Forecasts show that the demand for energy in China will soon increase considerably; thus, the dependence of China's economy on the world oil market will be greater. The present reserves of oil and gas per capita in China are below those in Russia, Ukraine, and Belarus by factors of 35 and 160 times (Varshavsky & Varshavsky, 1995). The need for a secure supply of oil may make China attempt to develop oil outside China and cooperate in developing oil in the area, which could lead to conflicts in, for example, the South China Sea (Lee Tai-Hwan, 1994, p. x). The same pattern can be found in the northwest. Military spending in the countries of the 'Chinese Economic Space' now almost equal Russian military expenditure (Varshavsky & Varshavsky, 1995). The nuclear industry of the People's Republic of China is increasing rapidly.

## 2.4 Military Capital Assessment for Predicting Conflict

One of the most important indicators is the share of military burden in GDP -  $m(t)$  - though for some countries its exact value is not known. Using an approach suggested by Kendrick (1976), we may roughly evaluate the *military capital* (or cumulative military expenditure) -  $MC(t)$  - for a given country or for the entire civilization under the assumption that a part of the  $MC(t)$  is retired annually with the rate  $r(t)$  (Varshavsky & Varshavsky, 1995; Varshavsky, 1996).

The value of  $MC(t)$  at the beginning of year  $t$  is given by this formula:

$$MC(t) = MC(t-1) + m(t-1)*GDP(t-1) - r(t)*MC(t-1), \quad (1)$$

where  $r(t)$  is the share of retired military capital,  $GDP(t) - GDP$ , in the year  $t$ .

The aspiration to increase the military capital is an indicator of possible increasing instability. Special attention should be paid to the dynamics of changes in military capital

(and real military potential) of neighboring civilizations. A prediction of the period when military capital of neighboring civilizations will become equal permits us to estimate the date of possible instability. The time interval  $S$  that is needed by civilization 1 to increase its military capital to the level of civilization 2 can be determined from the following formula:

$$MC_1(t_0 + S) = MC_2(t_0 + S), \quad (2)$$

where  $MC_1(t)$  and  $MC_2(t)$  are the military capital of civilizations 1 and 2,  $t_0$  is the initial year, and  $t = (t_0 + S)$ , i.e., the year when the potentials of the two civilizations become equal.

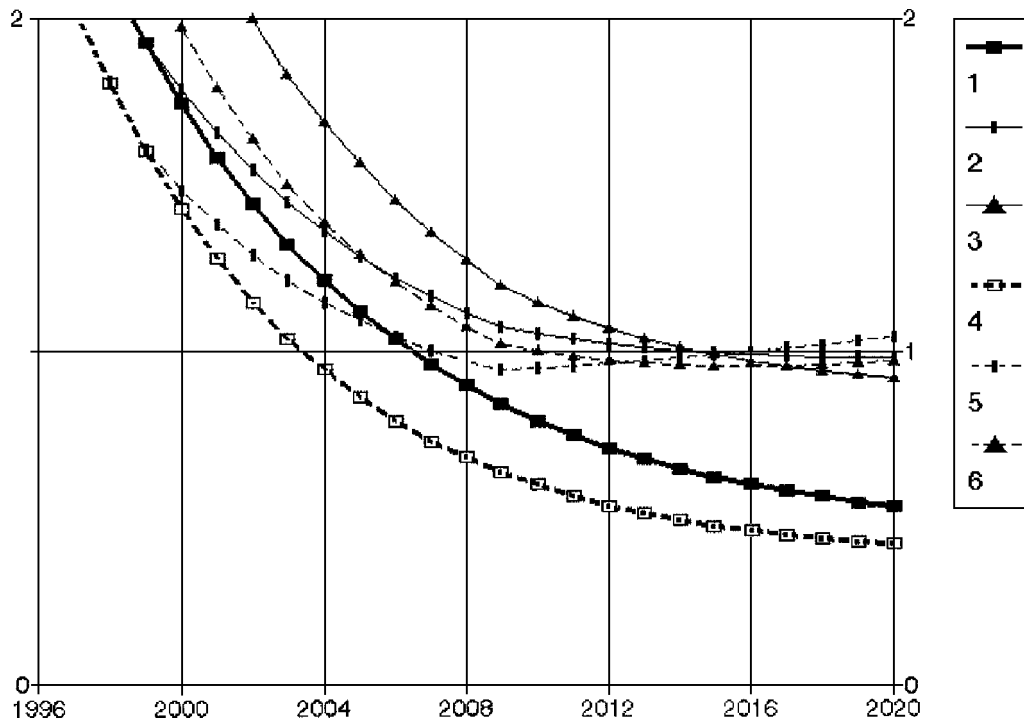
The assessment of the economic value of military capital (cumulative military expenditure) using formula (1) for China and for Russia and the bloc of Russia, Ukraine, Belarus, and Kazakhstan shows that the military capital of China and Russia will become equivalent after roughly 8-12 years (assuming the preservation of the existing share of defense expenditure in GDP). Figure 2.1 shows the possible dynamics of the military-capital ratio for the period 1996-2020. This is simulated for three hypothetical scenarios of future growth and two values of life cycle of military assets.

The results of this rough approximation show that the value of  $S$  depends mainly on the decrease of Russian military capital due to the process of retiring large volumes of assets created in the 1970s and 1980s. As Figure 2.1 shows, the period 2003-07, when the military capital of China becomes equal to that of Russia, will be the most dangerous with regard to increasing instability, taking into account the environmental change as well. Estimates show that, after a period of slowdown, the resumption of growth of the military capital of Russia and other Eastern Christian countries of the CIS may be expected approximately after 2003-07. But the bipolar balance between the two civilizations can be achieved only with great efforts by the Eastern Christian countries and only if the international community actively participates in the maintenance of stability.

The disintegration of the former USSR into separate, independent states may result in significant instability in the near future. Beginning from about 2003-07 it would be impossible to ensure the balance of the military capital with the existing share of Russia's defense expenditure in GDP. Curves 1 and 4 in Figure 2.1 show the ratio of Russia's military capital to China's will go below 1 after the period 2003-07.

The model shows that to preserve and maintain the balance, Russia will be compelled to increase the share of defense expenditure in GDP by approximately 2.5-3 times, up to 10-11% of the level in the USSR in the 1980s. This will negatively influence the standard of living of the population and will destroy many of the achievements of democratization.

*Figure 2.1 Forecast of Possible Change of the Ratio of Military Capital (Cumulative Military Expenditure) of Russia to China for Two Values of the Life Cycle of Military Assets, 1996-2020, USD billion*



1 and 4 – the present military burden of Russia

2 and 5 – the present level of Russia's defense expenditure relative to GDP increased by 2.5-3 times, up to the level typical of the USSR in the 1980s

3 and 6 – Russia together with Ukraine, Belarus, and Kazakhstan, with the present ratio of defense expenditure to GDP increased by 1.5 times

Integration of the countries that formed the nucleus of the former USSR is another way of maintaining global stability and preserving the democratization that was achieved at such a large cost. Curves 3 and 6 in Figure 2.1 show that the cumulative military capital of China and that of Russia together with Ukraine, Belarus, and Kazakhstan can be balanced with a smaller increase in the defense expenditure in GDP of Russia and the CIS countries.

These conclusions are confirmed by the work of Tsygichko (1995), which is based on forecasting the degree of possible threats to Russia (estimated as the probability of a threat times the degree of its potential danger under conditions of equality of forces). According to these assessments the greatest potential danger to Russia is expected in Chinese sector: if in 1996 it was three times higher than in the Western sector, then in 2000 this factor will increase to five and in 2005 to six times. The policy of the most developed countries, first and foremost the USA, must be aimed at the integration of the former republics of the USSR instead of their separation. The most developed countries should take into account



that, in case of conflict, the Western countries will inevitably be involved and will suffer significant losses.

Thus, economic analysis indicates that the main conditions for stability in the region, taking into account the environmental change in the near future, are the following:

- mutual desire of the countries of different civilizations to resolve all problems peacefully by economic and political methods;
- maintenance of neighborly relations and development of mutually advantageous cooperation as well as conclusion of the agreement on non-use of force for settling problems between the People's Republic of China and Russia;
- creation of a joint security system in the Asia-Pacific region with the participation of Russia, the USA, Japan, China, and other countries;
- increased control on proliferation and an end to tests of nuclear weapons;
- creation of economic, military, and political union of the Eastern Christian countries, possibly with some other states of the CIS; and
- urgent help of the Western countries in reconstruction and structural reorganization of the economies of the CIS states and inclusion of Russia together with some other CIS countries in a wider international bloc of Western European states (e.g., NATO).

### **3. Stability at the Local Level**

#### **3.1 Methodology**

Despite much study of the sources of local conflict, there is a lack of constructive suggestions for peaceful resolution, especially for ethnic conflicts. Mathematical modeling is a useful tool for settling local armed conflicts and assessing the environmental degradation caused by such conflicts. A great deal of work has simulated military action between the Superpowers (Isard, 1988; Intriligator, 1982). Less attention has been paid to modeling the dynamics of local armed conflicts (Clarke, 1985; Stahel, 1985).

In the present work, we analyze local armed conflict accompanying the creation of new independent states and the potential for escalation of the use of armed force, taking into account environmental change. The methodology of management of conflict is based on the involvement of a third party - a regional leader attempting to maintain military balance between the conflicting parties. To determine the strategies for maintaining military balance, a mathematical model of the dynamics of local armed conflicts is proposed. We do not claim that our model has universal application; it is aimed at the particular conflicts taking place in some republics of the CIS bordering Russia.

### 3.2 Local Conflicts in the CIS

Many of the local conflicts in the CIS countries are caused by unresolved ethnic and territorial problems (e.g., in Nagorno-Karabakh, Abkhazia, Pridnestrovye, and Southern and Northern Ossetia). These self-proclaimed new independent states were quickly recognized by the leading countries of the world despite the absence of real power over all their territory and of democratic traditions and institutions, and despite deep violations of human rights, particularly those of ethnic minorities. These developments strengthened the implacability of the conflicting parties and resulted in the escalation of the conflicts to full-scale wars with the use of modern weapons of mass destruction. Combat has been suspended in a number of regions, but stability has not yet been achieved.

The armed conflicts in the territory of the former USSR (especially in the southern regions of its European part) are characterized by the following features:

- location in small territories (the total area of all 'hot-spots' in Pridnestrovye and Transcaucasia is about 40,000 km<sup>2</sup>, with a population of a little more than 1.5 million) with predominantly mountainous terrain;
- high degree of popular participation in military actions (including women and teenagers, who have suffered because of repression and punitive action);
- significant military potential of the conflicting parties, using modern weapons -e.g., Azerbaijan had 285 tanks, 835 personnel carriers, 343 artillery systems, 58 military aircraft, and 18 helicopters at the end of 1994, exceeding limits established by the Conventional Armed Forces in Europe Treaty and the levels of some of the developed countries of Western Europe (*SIPRI Yearbook*, 1995);
- high intensity of military action and large numbers of casualties (in Nagorno-Karabakh the average monthly loss of the Azerbaijani army during combat was estimated at 6%);
- little domestic military production and high dependence on arms delivered to the conflict zone from outside;
- involvement of third parties pursuing their own geopolitical and economic interests through diplomatic actions, propaganda in the mass media, economic and political blockades, and even military support (Holsti, 1992); and
- the implacability of the parties, reinforced in most cases by territorial problems connected with unfair borders for a number of ethnic groups, as well as the chauvinistic propaganda, power asymmetries, and instability of the ruling regimes.

The high intensity of combat places a significant burden on the environment, resulting in landscape changes, deforestation, and destruction of water sources. Minefields represent a significant danger as well because they are often installed without necessary maps. Since

borders change during combat, large areas become littered with mines, leading to numerous accidents involving people and animals and to the destruction of machines and equipment. There is also the danger of short-wave electronic emissions from weapon systems. Numerous monuments and cultural treasures have been destroyed, such as the Pantheon of Abkhazian writers and the Abkhazian research and cultural centers in Sukhumi during Georgian rule (Coppieters, 1996, p. 55) and ancient Armenian churches in Azerbaijan.

### **3.3 Settling Conflicts with the Help of the Regional Leader**

Conflicts based on territorial claims are hard to resolve. As a rule, settling them is impossible without the active involvement of third countries (Garment & James, 1995). The solution must be based on international law, but frequently it also requires the use of pressure exerted by a powerful third country. Many conflicts are therefore settled with the help of regional leaders in whose zones of influence the conflicts take place. For all CIS countries, Russia, with a significant part of the military and economic potential of the former USSR, is that regional leader.

The strategy of the regional leader must take into account a number of factors: *economic, environmental, geopolitical, and political*. On this basis, the regional leader may have no choice but to maintain a military balance between the conflicting parties by delivering arms and rendering military and technical assistance with the purpose of compelling them to reach a compromise.

History reveals a number of examples of purposeful use of such a strategy by a third party, such as the USA's simultaneous military, technical, and economic aid to Turkey and Greece, or to Israel and Arab countries. Apart from the necessary military, economic, and financial resources, the success of such a strategy also requires political authority and the confidence of the conflicting parties.

For successful realization of this strategy, the international community should grant special authority to the regional leader. A legitimate basis of interaction between the regional leader, the conflicting parties, and the world community should be developed. In particular, it would be expedient to create an international commission which would have the right to deprive the regional leader of the power to manage the conflict, as well as the right to impose sanctions where deliberate infringement of the balancing policy results in large numbers of civilian casualties.

The development of a strategy for maintaining military balance of conflicting parties requires the use of quantitative models which adequately reflect the military and economic positions of the parties and their responses to the actions of the regional leader.

### 3.4 Model of Dynamics of Armed Conflict

Assessing the military potential of the parties and forming a strategy to maintain their military balance require a dynamic model of combat with several actors representing the direct and indirect participants in the conflict. The following model describes the case of a local conflict in a zone of influence of a regional leader delivering weapons to participants in the conflict. The manufacturing of arms by the participants is negligible in comparison with the deliveries of the leader. The model has the following form:

$$\begin{aligned} dX_1/dt &= -g_1(w)*X_1 + U_1; \\ dX_2/dt &= -g_2(1/w)*X_2 + U_2, \end{aligned} \quad (3)$$

with the initial conditions  $X_1(0) = X_{10}$ ;  $X_2(0) = X_{20}$  and with the following restrictions on phase and control variables:

$$X_i(t) \geq 0, U_i(t) \geq 0, \quad i=1,2, \quad (4)$$

where  $X_i(t)$  is the value of the military potential of party  $i$ ;  $U_i(t)$  represents the arms deliveries of the regional leader to party  $i$  ( $i = 1, 2$ ); and  $g_1(w)$  and  $g_2(1/w)$  are monotonically increasing functions of  $w(t) = X_2(t)/X_1(t)$  and  $1/w = X_1(t)/X_2(t)$ .

The system described in formulas (3) and (4) should be complemented by a condition of termination of combat (or conditions of compromise). Once again we proceed from the principle of maintaining military balance between the parties. In mathematical terms, this means that if party  $i$  is inclined to terminate combat at the definite level of cumulative losses of personnel ( $CL_i$ ), environmental losses ( $ED_i$ ), or losses of assets ( $AL_i$ ) ( $i = 1, 2$ ), the regional leader should maintain the military balance between the parties in such a way as to force both conflicting parties to reach a compromise at the same moment of time ( $T$ ).

In formal terms:

$$c_i * \int_0^{TCL} (g_i(.))*X_i(t)dt = CL_i, \quad i = 1, 2, \quad (5)$$

$$\int_0^{TED} f_i(X_1(t), X_2(t))dt = ED_i, \quad (6)$$

$$\int_0^{TAL} h_i(X_1(t), X_2(t), A_1(t), A_2(t))dt = AL_i, \quad (7)$$

$$T = \min (TCL, TED, TAL), \quad (8)$$

where  $c_i$  is loss of personnel per unit of losses of military potential;  $g_i(.)$  is a function of  $w$  ( $i = 1$ ) or  $1/w$  ( $i = 2$ );  $f_i(.)$  and  $h_i(.)$  are degrees of environmental losses and losses of assets; and  $A_i(t)$  represents the levels of assets of the parties ( $i = 1, 2$ ). The levels of cumulative losses allowable for the parties are set exogenously.

In addition to these restrictions, we also need to take into account a restriction on the value of the superiority of military potential,  $w(t)$ :

$$w_{\min} \leq w(t) \leq w_{\max}. \quad (9)$$

### 3.5 Desired Dynamics of Military Potentials

On the basis of this model [(3)-(9)], we can investigate several variants of the problem of managing armed conflict, including various strategies of optimization, such as maximizing the income of the regional leader from deliveries of arms to the conflicting parties.

As a rule, the actions of the regional leader do not fit a hypothesis of rational behavior in accordance with quantitative criteria, particularly those of an economic nature. Such criteria are predominant in decision-making on deliveries of weapons (Pierre, 1982). Nevertheless, there is a practical interest in determining feasible amounts of arms deliveries and the dynamics of military potential of the parties while satisfying the restrictions of the model. Among the *feasible* trajectories of military potential, we consider especially those that are efficient according to different criteria (*nominal* trajectories).

Trajectories of exponential growth are convenient as feasible trajectories of the military potential of the parties. In reality, the regional leader will never possess full information about the conflicting parties or whether their nominal trajectories are unstable. Thus, we need special algorithms enabling the regional leader to manage conflict under conditions of partial information. These algorithms should give us the changes in military potential of the participants along the nominal trajectories chosen by the leader. The strategy of management of arms deliveries should be non-sensitive to errors in estimates of parameters of loss functions. Both the changes in military potentials and the maintenance of their levels in close proximity to the nominal trajectory should be executed in accordance with this rule.

For that reason, two methods for the management of the dynamics of local ethnic armed conflicts have been offered. One is the continuous delivery of arms, characterized by low sensitivity to uncertain values of parameters of specific loss functions. Another is adaptive management, which does not require knowledge of either the kind of loss functions or the values of their parameters for the transition of military potential to a previously determined nominal trajectory (Varshavsky & Varshavsky, 1995).

### **3.6 Maintaining Military Balance**

The following is a possible scheme for settling local armed conflicts: After the initiation of local armed conflict, the Security Council of the United Nations (or a similar regional body) gives a mandate for settling the conflict to the regional leader. This mandate identifies the parties to the conflict and conditions for the resolution of it as agreed by the world community. The mandate should be approved by the General Assembly.

The regional leader informs the conflicting parties of the conditions for settling the conflict, possible consequences of its continuation, and terms for ending combat. If the parties accept the conditions for resolution of the conflict, the regional leader and the Security Council initiate bilateral negotiations. If combat actions are escalated, the regional leader begins arms deliveries to the participants. Simultaneously the leader, assisted by international organizations, supervises an embargo on arms deliveries from other countries. The arms deliveries are made contingent on the parties' ratification and observance of the basic elements of international humanitarian and environmental law, such as the Geneva Conventions. The arms deliveries take place under the control of international observers, and military potential and losses of the parties are monitored using all existing means, in particular satellite observation. In case of infringement of the norms of international humanitarian and environmental law by one of participants, the regional leader may cut arms deliveries to that party with the approval of the Security Council.

In case of capitulation by one of the parties, the Security Council, acting through the regional leader, promotes the conclusion of a peace agreement between the parties. Similarly, if the parties are ready to terminate combat operations simultaneously and reach a compromise settlement, the Security Council promotes a peace agreement and calls a peace conference on the establishment and recognition of new borders between the countries. When necessary, proposals for new members of the General Assembly are submitted to the UN.

To realize this scheme, the world community has to develop various legal and military mechanisms. In this way, the international community may contain local armed conflicts and keep combat operations on a more civilized level, even when they cannot be eliminated altogether.

## **4. Towards Stability**

The problem of global instability is not limited to the conflict between Western and non-Western civilizations. In the present transition to a multipolar world, the problem of global stability should be considered more widely. A number of countries aspire to significant arms acquisitions, including even the desire to possess nuclear weapons.

Western civilization is in contact with all others and will inevitably be involved in any conflict at the global level. It should obviously aim to strengthen global stability, taking into account in particular its traditionally close ties with the Eastern Christian civilization.

The geopolitical position of the Eastern Christian civilization makes its significant not only for Europe but for Western civilization as a whole. It is therefore an urgent task for the West to promote the economic and political association of Russia with the states of the CIS and to participate in the process of democratization in these states, enlarge the investments in their economies, and help to maintain the stability of their borders. The establishment of such a new world order implies a revision of global purposes, strategies, tactics, and economic policies, taking the environment into account.

The achievement of stability demands many radical transformations. The Universal Declaration of Human Rights and the International Pact on Economic, Social and Cultural Rights must be observed in resolving conflict. As Andrei Sakharov noted, a peaceful global development requires the resolution of regional conflicts, a balance of conventional weapons, liberalization and democratization, and respect for civil and political rights.

Russia, as the Council on International and Defense Policy has noted, is certainly 'interested in the closest strategic union with other Europe, in full rights participation in the all-European system of collective security' (Russia & NATO, 1995). Opportunities should be created for establishing close military and political cooperation between Russia and NATO and other international Western organizations. Eventually, a system of collective security should be created, for example by transforming NATO into an all-European system of collective security. At the same time, special attention should be given to relations with neighboring civilizations such as the Islamic countries and China. The long-term strategy must aim, on the one hand, at a peaceful decrease of tension and, on the other, at maintaining the arms balance to prevent armed conflict.

The most realistic way to settle local armed conflict is to solicit the help of regional leaders. When it is impossible to force the conflicting parties to resolve their problems peacefully, the regional leader must promote long-term conditions for the simultaneous termination of combat operations by both parties. The major component of such a strategy is the maintenance of a military balance between the conflicting parties by delivering arms while compelling them to compromise. The regional leader must be granted the authority to settle the conflict, while the participants must observe the basic norms of humanitarian and environmental law. Thus, a strategy can be developed which enables the parties to see the consequences of their actions at an early stage of the conflict and helps deter them from going to war.

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