

# THE PLANET MASTER

## A Radio Play

Joseph George Caldwell

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Synopsis. This radio play addresses the issues of human overpopulation and global nuclear war. The play describes the reasons why global nuclear war is likely to happen and considers a scenario in which Russia prevails after the war. Scene 1 describes the destruction to the biosphere that is being caused by large human numbers and industrial production. Scene 2 is a meeting with the Russian President, Prime Minister, and ministers of three portfolios – economic development, natural resources and environmental protection, and defense – in preparation for an annual presentation to Russia’s Duma. Scene 3 describes the state of Russia’s economy, and Scene 4 describes the state of its natural resources and environment. Scene 5 describes the nature and likelihood of nuclear war. Scene 6 describes goals, decision criteria, and strategy related to nuclear war. Scene 7 describes tactics for waging nuclear war. Scene 8 describes possibilities that might arise when access to important situational information is lost during nuclear war. Scene 9 describes implications of Russian goals and decision criteria, including discussion of how a small nuclear conflict could escalate to a large-scale one, and how Russia might prevail in such a war and establish a long-term-sustainable planetary management system. Scene 10 discusses long-term-sustainable population levels. Scene 11 discusses the state of the world twenty years after global nuclear war and Scene 12 describes an evening somewhere on the North American Great Plains, 500 years after the war.

Production Notes. Scenes 3 and 4 may be omitted for an abbreviated version of the play. Scenes 6 and 7 may be omitted for a further abbreviation. The play includes four sets: Scene 1 takes place in a radio studio, located anywhere in the world. Scenes 2-10 take place in a meeting room in the Kremlin, Moscow, Russia; Scene 11 takes place in the office of a human-resource officer in the Office of Planetary Management in Astoria, Oregon, 20 years after the occurrence of a global nuclear war; Scene 12 takes place outside a tepee on the North American Great plains, 500 years after this war.

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## **Scene 9. Some Implications of Russian Goals and Decision Criteria**

SCENE. The same as before.

VLAD. So, Dimitri, from what you tell me, in the event of a communications blackout, we attack the rest of the world in full force,

but the US attacks only identified attackers. Why is their approach so different from ours? You said that all parties use the same game theory to develop strategy and tactics.

DIMITRI. The difference is not in the game theory, it is in the goals and in the decision criteria. As I mentioned, we have adopted a hierarchy of goals. Let me recapitulate them:

1. a low probability of extinction of the human race;
2. subject to that, a low probability of continued destruction of the biosphere;
3. subject to that, a high probability that technology survives;
4. subject to that, a high probability that Russia survives;
5. subject to that, a high probability of establishing a long-term-survivable planetary management system.

In addition, we have adopted the Minimal Regret decision criterion relative to the goal of minimizing human extinction and establishing a long-term-survivable biosphere, whereas the US has adopted a criterion of minimizing expected damage to US assets preserving large human numbers and industrial production – and the global economic system.

By the way, I may loosely refer to the Minimal Regret criterion as a strategy. It is more correctly referred to as a decision criterion or a principle of choice than a strategy. The strategies and tactics flow from the decision criterion. It is common usage, however, to refer to the Minimal Regret criterion as a strategy, and I will tend to do so.

With the Russian strategy, the odds are better that the human race doesn't go extinct from large-scale nuclear war, but the expected damage – both inside and outside Russia, would likely be worse than it might have been. With the American strategy, the expected damage to

America and industrial society would be less, but the odds of human extinction would be higher.

The US goal is to achieve a high probability that it survives, and it claims to use the decision criterion of maximizing expected payoff. The US goal is to achieve survival of a large US and global population, and to keep industrial population high. That is what they care about, not the likelihood of extinction. The US is not concerned with the long-term survivability of the planet, which depends on substantially lowering industrial production. If they cannot achieve that, then they really don't care whether the human race survives or not.

They want the good life for themselves, regardless of the risk of extinction to others or even themselves. A good life for the wealthy, or nothing. Their goal has always been to grow, grow, grow, since growth affords spectacular opportunities for capitalists. They are not interested in a stable economy, and they are certainly not interested in a shrinking one. Some of their economists, such as Georgescu-Roegen, Daly and Cobb tried to promote a system of economics based on a steady-state equilibrium, but it was rejected.

We have adopted the Minimal Regret decision criterion because we view that there may be a single play of nuclear war, and we cannot afford to fail. As I said, the US view of maximizing expected return is appropriate for playing a sequence of battles, not for conducting a single one.

In a post-nuclear-attack world, we do not care about the size of the global economy. In fact, in the long term, we don't really care about economics. Economics is what got the world into its current mess, and it will not get us out of it. It is a fabulous system for achieving growth, and we have used it to that end ourselves. It is not, however, a good basis for managing a planet, long-term. Exponential growth enables

very rapid development of a biological organism from a fertilized egg to a baby, and eventually to an adult. But there has to be a mechanism to stop the growth, when it reaches desired levels. That is what capitalism was never able to understand or do.

Economic growth is addictive. No matter how much you have, you always want more, no matter what the consequences. We, on the other hand, recognize the importance of moderating the growth. We used economics to make Russia strong, but in the long run we have little use for it. Economics, or at least, non-steady-state growth-based economics, is not a useful basis for operating a planet in the long run.

In this regard, it is insightful to recall an observation made by the mathematician John Maynard Keynes. In his 1930 essay, “Economic Possibilities for our Grandchildren”, Keynes observed the fatal limitations of economics as a long-term basis for human society:

“I see us free, therefore, to return to some of the most sure and certain principles of religion and traditional virtue – that avarice is a vice, that the exaction of usury is a misdemeanour, and the love of money is detestable, that those walk most truly in the paths of virtue and sane wisdom who take least thought for the morrow. We shall once more value ends above means and prefer the good to the useful. We shall honour those who can teach us how to pluck the hour and the day virtuously and well, the delightful people who are capable of taking direct enjoyment in things, the lilies of the field who toil not, neither do they spin.

“But beware! The time for all this is not yet. For at least another hundred years we must pretend to ourselves and to every one that fair is foul and foul is fair; for foul is useful and fair is not. Avarice and usury and precaution must be our gods for a little longer still. For only they can lead us out of the tunnel of economic necessity into daylight.”

In the long run, as Keynes observed, we are all dead. In the long run, our sun runs out of fuel and the biological life of our solar system dies. In the long run, it does not matter a whit whether you do take a stand to protect your family, your culture, your nation. As the Teacher in Ecclesiastes states, "All is meaningless!" In the short run, however, things *do* matter. Life is not without meaning and purpose, but you must define the meaning and purpose. Your life will be defined by the stands that you take. As Shakespeare said, "All the world's a stage, and all the men and women merely players." This planet can support human society and nature for a few more years, or it can support human society and nature for several billion years more. The choice is ours.

Human society, including Russia, has used economics to establish high-technology civilization on a grand scale. But that phase of human development is drawing to an end. The age of global economics is drawing to a close. In the future, the planet will have no use for the dismal science. It is time for human society to move on. To put away the things of our youth, and take up the things of our adulthood.

What we care about is keeping the probability of extinction low and, subject to that main goal, preserving the biosphere and keeping the probability that Russia survives high. On the other hand, the US focuses on preservation of economic power and wealth, and is not terribly concerned about the likelihood of extinction. Their one true love is the current capitalist economic system. They are willing to bet the farm to preserve that. If they cannot have it, then it appears that they just want to pick up their marbles and go home. They are not interested in working with a destroyed post-nuclear war. We view that situation as an exceptional opportunity to save the biosphere and the human race.

The US is unconditionally committed to unconstrained economic growth. It is addicted to it. It has no mechanism for moderating it, even when it threatens its existence. All its leaders do is call for more growth – listen to any campaign speech or State of the Union address. The fact that the current size of human population and industrial production are upsetting the balance of the biosphere and causing a mass species extinction is of little or no concern. US leaders still call for more growth, every month, every year. To them, the fact that the world has eight billion people and is growing by one percent a year does not represent an existential threat, but a tremendous economic opportunity – a giant Petri dish for growing fortunes.

Economic growth has developed technological civilization, but with no effort to moderate it, it has become a cancer on the planet, a cancer that threatens to destroy the biosphere as we know it. It is not economics *per se* that is the problem – it is unconstrained, runaway growth that is the problem.

US goals and Russian goals are, in fact, diametrically opposed. Not simply with respect to the survival of the two countries, but with respect to the long-term survival of the human species and the biosphere as we know it. This profound difference in goals results in a profound difference in strategy and tactics. The mathematical theory is the same, but the goals and decision criteria are very different.

VLAD. The situation is that, under the Minimal Regret strategy, any country or group possessing nuclear weapons runs a substantial risk of annihilation from one of the two nuclear superpowers, and every country runs the risk of being destroyed by Russia. If that is so, why would any sane country possess a small number of nuclear weapons? They can never prevail, and they might be annihilated simply because they possess nuclear weapons.

DIMITRI. No one said that all countries are led by sane or rational people. Many leaders do not care about the welfare of the biosphere, or of humanity, or even of their citizens or children. They practice discounting in time and space to the extreme.

Perhaps they continue to operate under the illusion that Mutual Assured Destruction is a fail-safe deterrent against nuclear war. When a species becomes crowded, and the human species is crowded to the extreme, it begins to act irrationally, even suicidal.

VLAD. OK. Please tell me more about the nature of our response to the situation in which we lose all communications, such as if our satellite communications and location system, were taken out.

DIMITRI. OK, fine. Initially, as I mentioned earlier, it is an attack against cities, against population. There are actually two reasons for this. First, because population tends to be located where things of value or interest are located, such as industrial capacity, military installations, and energy sources. Attacks against many other types of value often look like attacks against population, when in fact the population casualties are just collateral damage. For this reason, an attack against population is often a useful surrogate for many other types of attack. How we fare in a population attack is a good general indicator of how we will fare in other types of attacks. If we fare poorly in a population attack, we are likely to fare poorly in other types of attack. That's why population attacks are considered so often in nuclear warfare scenarios, even if the goal is not to destroy population.

VLAD. But aren't people much more vulnerable to the effects of nuclear war than other things, much harder targets such as factories and dams?



DIMITRI. Yes, that is true. And because it is true, here in Russia we have made great effort to protect our population from the effects of nuclear war. We have started to disperse our population and industry, so that an attack against our industrial and military assets is not so much an attack against our population. We have built extensive fallout shelters for protection against both direct effects – heat and blast – and also against radioactive fallout and mild nuclear winter.

Our civil defense program, by the way, is quite different from the situation in the United States, where they have no defense shelters for the general population at all – just a few shelters for the elite. Most of our shelters are stocked with sufficient food and water to last a year or two.

VLAD. A year or two? That's quite a range.

DIMITRI. We don't know how many people will be killed by direct effects. That is the primary reason for the uncertainty. Fallout shelters are more survivable than people, if the people don't get to them in time. If lots of people are killed, the supplies last longer for the survivors.

In any event, there are two aspects to survival. The first is short-term survival -- surviving the direct effects, the radioactive fallout, and the nuclear winter. Defense shelters can help in this phase of post-attack recovery. The second is long-term survival – having annual harvests to support society in years following the war. There is no point to surviving all of these and then starving to death because no plans or preparations were made for afterward. To assure our long-term survival, we must have good plans and preparations for both the short term and the long term.

VLAD. Dimitri, a little earlier you said that there were two reasons for a population attack. You have explained one, namely that population locations are correlated with lots of other things that might be targeted. What was the second reason?

DIMITRI. Yes, I did describe only one of the reasons. The second reason is that it is large human population that is destroying the world. Although Russia has a low, stable population, in much of the rest of the world population densities and population growth are completely out of control. Here in Russia the density of people relative to habitable land is low, and our population growth is low. Large human population outside of Russia is destroying the biosphere, and threatening the existence of the entire human race, not just of Russia. As Walt Kelly's Pogo once remarked, "We have met the enemy and he is us." It is for this reason that population may be targeted in and of itself.

VLAD. Dimitri, quite apart from moral considerations, it is not politically possible to advocate an attack against population. It is acceptable to cause population casualties as collateral damage, but not to target population *per se*.

DIMITRI. But history is replete with attacks against population, from time immemorial through the Second World War.

VLAD. That is true. But population attacks are quite unnecessary in today's world. There are other effective means of achieving our goals and objectives.

DIMITRI. I am not sure that I am following you. You do agree that it is large human numbers and industrial production that is destroying the biosphere?

VLAD. Of course I do. But the large numbers are possible only through the use of energy in amounts far exceeding current solar energy levels. There is no need to target population directly. That is treating the symptoms of the problem, not the cause. Simply target the energy resources. Or target any other targets of military or economic value. That accomplishes the goals of interest and is politically acceptable.

DIMITRI. OK, I have no problem with that.

VLAD. OK, that settles the issue of population attacks. With respect to the Minimal Regret strategy, could you clarify exactly what it is that we are trying to regret?

DIMITRI. Of course. There are actually several things. First is the extinction of the human race. Second is destruction of the biosphere as we know it, with a tremendous diversity of species, including large species and mammalian species. Third is extinction of technological society. Fourth is extinction of Russia. What we do is develop a strategy that addresses these issues, in order.

VLAD. Why is it important to avoid extinction of the human race? If we are all gone, what does it matter?

DIMITRI. Well, I agree, if we are all gone, it certainly doesn't matter to us! The goals that I mentioned were derived from philosophical considerations, and subjective value judgements. Some people believe that human beings may be the only intelligent life in the universe, and that it would be a shame to lose the human species because of its uniqueness. It can be a shame, of course, only if someone or something remains to perceive the loss. Others view that all life ends as the universe dies, so that, in the long run, nothing matters at all.

Some people value biodiversity and would like to see future generations living in the same diverse biosphere as the one in which we evolved. Some people view that a technological civilization is preferable to a nontechnological one. Some people view that Russian culture is superior to others. And worth saving, particularly if its existence promotes the likelihood that the human species will avoid extinction.

Some people view the specter of an apocalyptic post-nuclear-war society with such dread that they would prefer not to survive the war. Unlike the pioneers who settled America, present-day Americans are unwilling to undergo hardship and suffering for the sake of future generations. They have lost the pioneering spirit that made them great. They don't look farther into the future, to a rejuvenated biosphere. They value only themselves and their wealth, not other species, and not even future generations of themselves. Today's America is living in the present, only for itself. With respect to the future – both for itself and the planet – it has lost its sense of destiny.

The prevailing view is that the most important consideration guiding our decisions is how we ourselves feel about them. At the moment, we are the ones in charge of the planet's destiny, of mankind's future. It is our views that matter. We have the vision and the will to mold it as we see fit. The strategies that I have described reflect Russian values and Russian desires, both for Russia and the world.

It is our goal and belief that we can wage nuclear war in such a way that Russian society survives and is successful in establishing a long-term-sustainable planetary management system. Those living through the immediate aftermath of global nuclear war will indeed experience hardship, but the long-term prospects for a better system are good, and future generations will be much better off.

VLAD. I hate to beat a dead horse, but could you reiterate why saving Russia isn't first on the list of priorities? In order to save Russia, it follows that you have to save the human race. It is so much easier to sell the former over the latter.

DIMITRI. Your assertion that to save Russia it is necessary to save the human race first is logically correct. It could be, however, that in striving to save Russia, the probability that the human race goes extinct may be increased. In developing strategy, it is generally preferable to keep things simple, and to focus on the most important issues first. Keep the main thing the main thing.

VLAD. OK, but let's not forget that for our immediate purposes the main thing is to sell this program politically. Let's go on.

While extinction is a binary outcome, biodiversity is not. Nor is technology or Russian culture. How do you distinguish among outcomes? Do you set intermediate goals?

DIMITRI. Yes, we absolutely do. Let's talk about biodiversity. At the present time, large human numbers and industrial activity are destroying the planet's biodiversity at a prodigious and alarming rate. If this destruction continues, the human species could be doomed, with or without nuclear war.

Intermediate goals are generally *ad hoc* goals. As major events occur, we may modify our goals to fit the new situation. If the facts change, then we may change our decision. An intermediate goal, for example, if we could not accomplish our ultimate goal of establishing a planetary management system, might be to destroy the cities of Brazil, since Brazil is in the process of destroying the Amazon Rain Forest – the so-called “lungs of the planet.”

VLAD. What you have just described is a *bona fide* population attack.

DIMITRI. [Exhibiting frustration.] Virtually all attacks in large-scale nuclear war are population attacks! You can't avoid that! It is the human race that has caused the massive environmental and existential problem we are facing!

VLAD. OK, Dimitri, OK. No need for histrionics. I'm simply making an observation.

DIMITRI. [Composing himself.] Well, yes, I agree that what I described would be a *bona fide* population attack. In this case, however, it is human population that is directly destroying a crucial part of the biosphere. There are no significant targets of force or value the destruction of which would stop the destruction of the rain forest. The peasants are clear-cutting the forest, selling the timber, and doing subsistence farming for a couple of years until the soil turns to brick, never to return to rain forest.

VLAD. Hmm. You make a valid point.

[There is a pause, while both men reflect.]

## **Scene 10. Some Discussion of Sustainable Population Levels**

SCENE. The same as before.

VLAD. I would like to have some further discussion of the issue of population. The levels of population that might survive a large-scale nuclear war. I don't have a good sense of that. I would like to know how many people – both inside and outside of Russia – are likely to

survive, how many are needed to maintain control and accomplish our goals, and how many can be supported long-term.

Let me begin with some observations. You say large human numbers are a threat to mankind's existence. But Russia's population is not large, and has been stable for years. Our population density is low and we have been living within our means. To a substantial extent, we have protected our natural environment. Except for exporting a lot of energy and natural products, our GDP per capita and our energy use per capita are modest – the Russian people are not consuming prodigious amounts of the planet's resources. It is not large Russian population and Russian industrial production that is destroying the biosphere and threatening human existence. It is the population explosion outside of Russia that is the problem. Russia is acting responsibly, but we are going down with the sinking ship because of people who are not.

To date, no significant effort has been expended to reduce human numbers and industrial population to levels that would not cause further destruction to the biosphere. I would like to know to what extent would this goal be achieved, were a large-scale nuclear war to occur. Let me make it very clear, however, that I am not proposing nuclear war as a means of lowering human population to sustainable levels – I just want to know to what extent population levels would be reduced if global nuclear war were to occur.

DIMITRI. A large-scale nuclear war could cause the deaths of a substantial portion of the human population, from direct effects. A large attack would cause the collapse of the world's food production and distribution system. Because most of the world does not possess defense shelters, as we do, a major portion of the world's population would die of starvation, possibly within a month or so.

VLAD. So, after the die-off, how many are left?

DIMITRI. If the war wipes out all sources of energy other than that obtained from current solar flux, that is, sources such as oil fields, coal fields, and nuclear power plants, then the number that are left will be the number that can be supported by current solar energy.

VLAD. And that number is?

DIMITRI. The answer depends on what level of living the survivors have. If all of the survivors are hunter-gatherers, the number is about half a million people. If all of the survivors are high-tech people consuming massive amounts of solar energy and they attempt to limit damage to the biosphere, the number is about the same. If the remaining population reverts to primitive agriculture, the number is about 300 million, assuming that a good portion of the readily available solar energy is used for human purposes. If the remaining population is agricultural but makes efficient use of solar energy, this last number can be increased, say to 500 million. If the population is a mix of high-tech and low-tech people, the long-term number is probably somewhat less than 300 million.

VLAD. Mariya, do you agree with these numbers?

MARIYA. Yes, generally I do. They are based on our knowledge, or estimation, of how many people existed on the planet as hunter-gatherers, before the advent of agriculture, and how many existed after agriculture developed. There is a lot of speculation and disagreement about the maximum number of human beings that the Earth can support for a short time, but it is generally accepted that the number that can exist in balance with the biosphere – a long-term-sustainable population – is quite low. Now that agriculture is out of the bag, mankind as a whole is never going back to a hunter-gatherer existence,



and we are probably looking at a few hundred million people as a sustainable long-term human population that can live in harmony with the rest of the biosphere.

The problem is, however, with technology and energy, human beings always strive to grow, both in numbers and in material quality of life. They attempt to use all solar energy and all of the planet's habitable area for themselves, to the exclusion and extinction of all other species. If you get rid of the nonsolar energy, there is a natural limit on the size of the human population. It is the use of sources other than current solar energy that enables human population to reach suicidal levels.

VLAD. So, Mariya, what if nonsolar energy sources are left intact?

MARIYA. Then the human population will likely increase again to high levels comparable to those that we have today, which are destroying the biosphere.

VLAD. So if your goal is to avoid extinction of the human race and preserve biodiversity, all nonsolar energy sources should be destroyed? In fact, you are saying more than that. You are saying that people are the problem. Energy doesn't destroy biospheres, large numbers of people using unnaturally large amounts of energy do. You are proposing destruction of energy resources in order to limit human population size. Why don't you just say that – that people are the problem and that people are therefore the target. Why are you beating around the bush?

MARIYA. Because it is pointless to kill people as a means of reducing human population and industrial production. As long as people have access to large amounts of energy, their population will soar to the limit. It is not just pointless, it is needlessly cruel, inhumane and inefficient. It generates hatred, resistance and social unrest. It is what

Hitler did. It is not an elegant solution to the problem. It is a morally bankrupt approach, given that there is another approach that is both more humane and more effective. Like rabbits, people just keep multiplying, as long as they possess the means. That is human nature. The direct approach of killing people as a means of population control would never work, and even if it were used, it would have to continue indefinitely.

A more rational, efficient and humane solution to population control is to destroy all non-current-solar energy sources. To control resources. It is not then necessary to kill anyone to effect planetary population control. The human population adapts to the level that can be supported by current solar energy. This is the mechanism that nature uses. It is not only natural, but humane. Destroying or denying resources is an accepted means of warfare. It has been used by all cultures, such as in countless sieges against cities, the British against the Boers, naval and economic blockades, and the US government's campaign against the American Plains Indians, in wiping out the buffalo, their means of livelihood. Denying access to resources is an acceptable method of warfare. Destroying infrastructure or energy sources is accepted. Slaughtering civilians is not.

VLAD. It seems to me that there is not a lot of difference between destroying population and destroying the resources population needs for survival. The end result is the same.

MARIYA. The fact is, it is large human population that is destroying the biosphere, and Russia along with it. I agree with Dimitri on this point. The rest of the world is committed to maintaining the high population levels that are a direct threat to Russia's existence. Large human numbers and industrial production are the enemy. To save Russia, they have to go. The point that I made was that it is neither moral nor

necessary nor efficient to limit population directly, that it is preferable to limit energy resources.

While I agree with you that there may not be much difference in outcome between destroying population and destroying the resources on which they depend, there is a profound moral difference.

There is also a profound operational difference. Alexis de Tocqueville observed that people will accept constraints on the big things, if they have freedom in the little things. That is, they will accept general, higher-level limitations on their liberty if they remain free to make decisions about very human activities in their day-to-day life. They would be willing to accept reasonable constraints on resources, if they retained considerable freedom to do as they please at the personal level. Particularly if the constraint is essentially a natural limitation, such as the requirement to live on the budget of current solar energy. On the other hand, they would object strongly to personally intrusive measures such as state-imposed population control.

VLAD. So, Marita, is what you have just described what you are proposing? That is, controlling population by controlling access to energy?

MARIYA. What I just expressed are personal views, not Ministry policy. It is somewhat out of my scope to say what should or should not be done, in a political context. I am in charge of a ministry of natural resources and environmental protection, not of population control. I am more comfortable making objective assessments of the implications of alternative situations.

It is my view, however, that, now that technology is available to the human species, it is impossible to maintain a long-term-survivable biosphere with more than a single nation in charge of the planet.

VLAD. Why do you say that?

MARIYA. Because a single nation, committed to a long-term-survivable system of planetary management, can be rational and objective in controlling the size of human population, both within and outside its borders. With multiple nations, you have what is called the “tragedy of the commons.” People care only about their own turf. What is occupied by other countries or is held in common, is overused and ruined. In a world with more than one country, there is motivation for increased military and economic power relative to other countries, and hence for growth. With a single nation, that is not the case. A consortium of nations will never be able to manage a planet. A ship – any ship, such as Spaceship Earth – must have but one captain. And it is not run by growth-based economics, but by reason, rules and discipline.

VLAD. So it is authoritarian, not democratic?

MARIYA. All political entities are authoritarian, to a degree. There can be democratic aspects, of course. The leadership must flow from inspired, enlightened, higher principles, not from common, base desires. It must flow from accepted, worthwhile, high-level goals, such as preserving the human species and the diversity of the biosphere. Rationalized, if you will. Quite unlike the current planetary management process, which is chaotic and destructive.

Having a planetary management system is necessary, but it is not sufficient. The planetary management system must be committed to long-term survival of the biosphere, with the human species living in harmony with it. The vision, mission and goals of the planetary management system must be enlightened.

VLAD. Mariya, you seem to know a lot more about planetary management than is reflected in your background information or in your briefing. What do you see as the long-term situation for the planet?

MARIYA. Yes, I have studied this problem a lot. I was surprised earlier when Dimitri spoke of the Minimal Regret decision criterion for waging nuclear war. In fact, the same approach – the Minimal Regret criterion – has been applied to determine feasible long-term-survivable solutions for planetary management.

VLAD. And what does this tell us?

MARIYA. Well, the solution is not very precise. It is known, for example, that human species existed for millions of years in harmony with the biosphere at a population of about half a million hunter-gatherers. In the terminology of optimization theory, that is called a *feasible* solution – one that is known to satisfy the constraints, but is not necessarily the best, or *optimal*, solution.

There are 1.41 billion hectares of arable land on the planet, and we can use this as a basis for estimating the number of people that the planet can support. Using only current solar energy, it takes about three hectares of arable land to support one person, at a low standard of living. That works out to about 500 million people, if all of the planet's arable land were occupied by human beings engaged in primitive agriculture. If not all of the planet's arable land is occupied by human beings engaged in agriculture, then the number is less.

A high-tech person consumes about 100 times as much energy as a low-tech one. So that means the planet can support about five million high-tech people, if no energy is available from other sources. But energy *is* available from other sources, such as nuclear. Let us suppose

that Russia prevails in a nuclear war with 150 million Russian survivors – approximately the entire population of Russia. This number of survivors is unreasonably high, but let's use it as a limiting case, for the purpose of an example. The country could support almost that population on solar energy if they were all farmers, but not if they were all high-tech people. To support that size population would require tapping a substantial amount of nuclear energy. Let us assume that this is done.

Now, let's consider the rest of the planet. Outside of Russia, there is about 1.28 billion hectares of arable land. If all of this land were used for human purposes, then, using primitive agriculture, it could support about 400 million people – I am truncating numbers a little here, to keep the example simple. But it is not reasonable to use all arable land for human purposes, for agriculture – that crowds out other species. Let us assume that we use just one-tenth of the world's arable land for human agriculture. That would support 40 million people. Since hunter-gatherers live in harmony with other species, they could use all of the rest. As we just discussed, that number is about five million.

In summary, a reasonable estimate might be up to 150 million high-tech people in Russia, and 45 million people in the rest of the world, of which 40 million are farmers and five million are hunter-gatherers.

VLAD. Wow! Those numbers are really low!

MARIYA. Most people do not realize how small the human population must be, if it is desired to live in harmony with the rest of the biosphere, and on current solar energy.

VLAD. In your example, you assumed that all 150 million Russians survive. I agree that that is not a reasonable example. What is the

minimal number of Russians who would have to survive in order to be capable of implementing a viable planetary management system?

MARIYA. Dimitri and Eric are in a better position to answer that question than I am. My estimate is that it would require between five and 50 million people to manage the planet, now that technology is out of the bag. That assumes that steps have been taken to eliminate all industrial capacity outside of Russia. The high-tech society has to possess a high-tech industrial capability. That requires a certain level of population. Eric might be the best one to ask for a better estimate of what would be required.

VLAD. OK, but your view is that an effective planetary management system could be represented by a high-tech nation of 50 million and a low-tech population of 50 million distributed over the rest of the planet?

MARIYA. Yes, in my view, those are reasonable numbers.

VLAD. After the war, most nations will be destroyed. At that time, the nonsolar energy sources will not belong to anyone. What is the current military doctrine with respect to destroying these targets?

DIMITRI. If there is no nuclear war, the fossil fuel reserves will be exhausted anyway. By destroying them in war, you simply put a halt to large industrial production before it would otherwise decline naturally. Taking out the fossil fuel sources would help matters by bringing a halt to the species destruction associated with the remainder of the petroleum age. If we take them out, we stand only to gain, with respect to biodiversity. Under current doctrine, we take out all major oil fields and coal fields. We cannot do more than that, or destroy a large number of nuclear power plants, because we do not have a sufficient number of nuclear warheads.

VLAD. Do we take out hydroelectric dams?

DIMITRI. Hydroelectric dams are a form of current solar energy. Our policy is to leave them alone. You can argue either way. In the long run, they silt up. Without maintenance of the dam and the distribution infrastructure, they don't produce energy. Many people prefer wild rivers to reservoirs. There are so many hydroelectric dams that we could take out only the larger ones, anyway.

Whether hydroelectric dams are left in place or not, the planet would return to hosting a current-solar-energy human society. A solar society. A solar world. A solar civilization.

Human society will consist of two components – a single high-tech nation that controls the planet, and a low-tech population everywhere else. The high-tech population has a high per-capita energy utilization, and the low-tech population has a low per-capita energy utilization. The low-tech population consists of a primitive-agriculture society and a hunter-gatherer society. The purpose and function of the high-tech society is to assure that the human species survives, and goes on to do all the wonderful things that it does and can do. The high-tech society accomplishes that end by keeping global human population at low levels, insufficient to cause changes to the biosphere. The purpose and function of the low-tech society is to lead meaningful, happy lives, within the limits of current solar energy. With a low planetary population, they will have access to a rich biosphere in which to make this happen.

Note that since the human population is spread over the planet, the probability of human extinction from a single local event, such as a volcanic explosion or asteroid collision, is reduced.



The planetary population that I have described – a single, low-population, high-tech nation on the one hand, with the rest of the planet occupied by a low-tech population, is, as Mariya said, called a Minimal Regret population. It results from the same decision criterion as we use for determining how to wage nuclear war, but it has nothing to do with nuclear war. It is simply the Minimal Regret decision criterion applied to a different problem.

VLAD. OK. So, to summarize, if nuclear war begins and our communications are taken out, and we have no idea what is going on, our optimal response, under the Minimal Regret decision criterion, is to wipe out modern civilization everywhere on the planet, except for Russia. Including the destruction of all nonsolar energy sources.

DIMITRI. That is essentially correct.

VLAD. Why do you say “essentially correct”? Why not just “correct”? How does what I said differ from what you said?

DIMITRI. Because the US is capable of destroying Russia. In your summary you seemed to imply that Russia – the physical country – would not be destroyed. We do not believe that that the physical destruction of Russia will happen, but it is possible. As I discussed earlier, we cannot guarantee the survival of specific people or locations. We can only work to increase the likelihood of survival of a Russian functionality, somewhere. The physical country of Russia could be largely destroyed, or denied to us by fallout. If that happened, we have contingency plans to set up operations in another country.

VLAD. You mean, move Russia?

DIMITRI. Yes, that is what I meant. For example, Canada has a very few large cities, and hence few targets. It is almost certain to suffer

relatively little damage to most of the environment. If Russia is destroyed, we could set up operations in Canada.

VLAD. What is the likelihood of pulling that off?

DIMITRI. Very high. We already have credible contingency plans for doing this. Not just for Canada. We have plans to set up remote outposts on all continents. We have made preparations to do this. If the need arises, we are ready.

VLAD. If many Canadians survive, how do we handle that?

DIMITRI. As Machiavelli observed, there are three main ways of conquering a people. Destroy them utterly, or set up a puppet government, or move in and overcome them demographically – that is, breed them out.

Basically, our approach in global nuclear war is to target all large populations. Many people will survive the direct effects of the weapons, but their countries have not built defense shelters, either for protection against fallout or for sustenance through a growing season. As a result of this lack of preparation, many people will die of radiation exposure, and most of the population will die of starvation. The starvation will reduce the global population to low levels. What remains will not be capable of organized resistance.

You could argue that we are using Machiavelli's approach number one: destroy them utterly. But we are doing little more than collapsing a house of cards. Modern civilization has elevated human population to extreme levels, and the world's nations have not prepared for large-scale war. Modern civilization sowed the seeds of its own destruction. Human population has soared far beyond the level that can be supported by current solar energy, and the global economic system

that feeds it is extremely fragile. Bringing about its collapse requires little effort.

In the case of Canada, much of the population is in a few large cities. Canada has not prepared for large-scale nuclear war – its population is not dispersed. Because we would have targeted the major cities, not much of the population would survive the direct effects. We have equipment and supplies in place, and we have prepared for a post-attack invasion of Canada – or any other suitable surviving country, for that matter. Canada is not Russia, but it will do. Eventually, when radiation levels fall, we can reestablish in Russia. Or, we might just stay in Canada.

VLAD. OK, we got sidetracked. We were talking about targeting energy sources. What if we do the population attack, but leave all energy sources intact?

DIMITRI. It could be that the collapse following a large-scale nuclear war would be so devastating that few survivors would or could make use of the surviving energy sources. It takes high technology to run nuclear power stations. It takes high technology to extract oil and refine it. It takes high technology and infrastructure to generate and distribute energy from hydroelectric dams.

As I mentioned, large-scale nuclear war is time-sequential. Shoot-look-shoot. If after the initial exchange no one is operating any of these facilities, then there is no point to wasting nuclear weapons on them. The number of nuclear power plants, oil fields, coal fields and hydroelectric dams is quite large. We don't possess the nuclear-weapon stockpiles to destroy a large portion of them. A better strategy might be to observe which ones resume operation, and destroy them in a later attack.

VLAD. What do you mean, shoot-look-shoot? Are you assuming that the communication and navigation satellites have survived?

DIMITRI. If they do, then we would use them. If they don't, then we are prepared to send up new ones. That is not, however, our plan. For planetary surveillance in the future, we are planning to use nuclear-powered drones, supplemented by solar-powered drones. In the future, long-term, with sparse population, we do not see the need for expensive global satellite systems.

VLAD. OK, Dimitri, your presentation was very informative. Is there anything else that you wish to add?

DIMITRI. Yes, there is. Up to now I have been discussing general concepts. This year, a major breakthrough has occurred that will dramatically affect the global balance of power with respect to nuclear war.

VLAD. And that is? [Rolls his eyes.] As if I didn't know.

DIMITRI. That is, as I mentioned earlier, the development of a nuclear-powered cruise missile.

VLAD. Yes, that is a real game changer. Tell us about it.

DIMITRI. Historically, the main way to achieve very long ranges for nuclear warheads was to use intercontinental ballistic missiles, sea-launched ballistic missiles, or missiles launched from strategic bombers. Nuclear weapons can be mounted on cruise missiles, but the range of those missiles, using conventional propulsion systems and launching platforms, is somewhat limited. This past year we completed the development of a nuclear-powered cruise missile. It is very fast, and its range is unlimited. It can reach anywhere on the planet from here in

Russia, and it is difficult to intercept. We are now in a position to target any location on Earth with high reliability. We are no longer dependent on missile silos, submarines, or strategic bombers.

VLAD. And how does this change things?

DIMITRI. Well, as I said, the major delivery vehicles for strategic nuclear weapons to date have been intercontinental ballistic missiles launched from silos, submarines and bombers, and the major defense against these have been missile interceptors. Kinetic-energy and high-energy beams have not proved practical. All of these delivery systems are vulnerable to interceptors. Because cruise missiles fly fast and low, following the nap of the Earth, they are very difficult to track with radar, and to shoot down. The nuclear-powered cruise missile renders most missile defense systems obsolete, and it can reach any place on the planet.

VLAD. What are the implications of this? Since we can now destroy any target, nuclear war is once more unwinnable. Does this mean that we return to the MAD strategy? At least, vis-à-vis the US and Russia?

DIMITRI. If the US also had this technology, it could. But it does not. What this development means is that MAD is totally obsolete, if it wasn't already. As was discussed earlier, MAD is really obsolete, now that nuclear weapons have proliferated. More significantly, it means that the US is motivated to undertake a first strike. Its only practical defense, under the present circumstances, is to initiate a first strike that would take out a lot of our cruise missiles. Unfortunately for them, these missiles are easily hidden, and destroying them would be difficult to do.

VLAD. There is an alternative available.

DIMITRI. And that is?

VLAD. Share our nuclear-powered cruise missile technology with them. Then both powers would be balanced again. We already know that they are working on that technology – we just developed it first. It is just a matter of time until they achieve it.

DIMITRI. Yes, it is just a matter of time, whether we share the technology or not. On the other hand, we have always believed that the US contemplates a first strike. With cruise missiles, a first strike would be devastating. I agree that the US will develop this technology eventually, anyway. In the long run, nothing would be gained by sharing it with them. Until they possess that capability, however, we in fact possess a strong advantage. We should retain it for ourselves, and not share it with them.

VLAD. Dimitri and Mariya, this discussion has been very informative. You have both presented strong arguments why the current planetary management system, which promotes large-scale industrial activity and growth, is dysfunctional, and that what is needed is a planetary management system committed to long-term survivability of the biosphere and the human species. Establishing and operating such a system will require some very difficult choices.

If global nuclear war occurs, billions of people will perish, as the population decreases to the level that is supportable by current solar energy. From what you have told me, global population will eventually settle to that level eventually anyway, even if global nuclear war does not occur. Nevertheless, if global nuclear war does erupt and Russia emerges victorious, it will be characterized as the greatest mass murderer of all time. Is that what we want for our legacy?

DIMITRI. I am not sure what you are asking? Whether it would be preferable that some other country win the war, so our reputation remain unsullied?

VLAD. No, not at all. Russia, as any nation, has every right to defend itself. What I am asking, indirectly, is whether we should list as a goal the establishment of a planetary management system. It is the issue I posed earlier – that it is accepted that a country may destroy other countries to defend itself, but not to promote a higher goal.

DIMITRI. I do not understand why you are asking this. Establishing a long-term-sustainable planetary management system is a worthy goal. All people would be in favor if it as a general concept, even if they might resent the fact that it would be Russia setting it up.

VLAD. I am asking it because I am concerned about selling this program, with your lofty goals of establishing a planetary management system. It is much easier to sell a defense program that defends only Russia, than one that defends the biosphere and all of humanity. I am not sure that the Duma will buy what you are proposing.

DIMITRI. The fact is, the biosphere cannot support more than a few hundred million people on a long-term basis. The current population is about eight billion, and, if current trends continue, it may even rise to ten billion. Most of that enormous population is going to die of starvation, with or without nuclear war. That is not Russia's fault – Russia is living within its current-solar-energy means. It is not Russia that is overpopulated – it is the rest of the world. The current economic system enabled the human population to grow far beyond the levels that could be supported using a small fraction of the planet's solar energy flux. It is globalization that caused the human population explosion, and it is globalization that is responsible for the coming die-off.

Earth's current large human population is doomed, independent of nuclear war, since it is destroying its biosphere. The only significant issue to address is whether, at some point in time, a long-term-sustainable system of planetary management can be established. The occurrence of a large-scale nuclear war may represent an opportunity for that to happen. Or it may not. Who knows, for sure? All we know is that nuclear war is likely to happen, and when it does, we should be prepared and have a plan.

In the aftermath of global nuclear war we may simply sit and view an apocalyptic wasteland, or we may choose to pick up the pieces and make the best of a bad situation. We already have a very bad situation – large human numbers and industrial activity are destroying the biosphere, and humanity seems powerless to do anything about it. It could be that a global nuclear war could change the situation sufficiently to enable meaningful change to be implemented, with the prospect of a better future.

All nuclear powers attack population, because population tends to be located where anything of value or interest is located. In global nuclear war, population casualties are unavoidable. The only warfare in which there are no civilian casualties is one-on-one combat with swords.

In the absence of technology, the biosphere was a self-regulating system. With technology, human activity can change the biosphere beyond recognition, and human control is therefore essential. We can certainly continue to use high levels of energy for a time, but if we do, we will no longer have the same biosphere that we evolved in. To assure the long-term survival of our species, someone must control the total amount of energy being used by human beings. Effective planetary management requires intelligent and difficult choices. It is



not for the soft-headed or the soft-hearted. Russia possesses the skills, power and will to do this. Other nations do not.

VLAD. But you are not proposing the use of global nuclear war as a means of stopping the human-caused sixth species extinction?

DIMITRI. No, not at all. Large-scale nuclear war could be very damaging to the biosphere. It is to be avoided. It is true that it could bring a halt to the mass species extinction, but it is also true that it could change the biosphere profoundly. The point is that global nuclear war might happen, and if it does, we should be prepared for it.

VLAD. OK. Thank you very much, all of you, for your insights. [He pauses.]

Here is what I have decided. I do not believe that the Duma, or the Russian people, would be happy about paying for establishing a planetary management system and saving the biosphere and humanity. They are quite willing, however, to pay for defense of Russia. Therefore, I want all of the material that you have presented on planetary management, the biosphere and preservation of the human race shifted to Mariya's portfolio.

DIMITRI. What! That is a major redistribution of responsibilities! Those are legitimate goals, some of which can probably be accomplished only by war.

VLAD. I agree that they are worthwhile. That is why I am keeping them. I just can't sell them as part of our defense program. I can sell them as part of our environmental protection program.

DIMITRI. I see.

[There is a lengthy pause.]

VLAD. OK, the hour is getting late, and we have completed presentations from economics, natural resources and defense. Let's wrap it up for today.

DIMITRI. But I haven't finished the fourth part of my presentation, on the aftermath of nuclear war! What happens after the initial strike! The time-sequential aspects! Mop-up operations! Maintaining the peace!

VLAD. I'm sorry, Dimitri, but we will have to address that some other time. I have to get to another meeting. We sort-of got bogged down in details, but it was worthwhile. In any event, I have to go.

[Addressing the others.] Please revise the background document to be consistent with what we have discussed today. Your next steps are to work up objectives and plans to correspond to the policy and goals that we have discussed today. I believe that the discussion has been very useful. In our discussion, we departed a lot from the SWOT format. Try to use that format, if you can. Thank you very much.

## **Scene 11. In the Office of Planetary Management**

SCENE. The time is twenty years after a global nuclear war. The location is an office in the Office of Planetary Management in Astoria, Oregon. Two people are present. Mrs. Olga Komarova is a human resources officer, who is interviewing a candidate, Peter, for a position in the Office. Madam Komarova is holding a dossier in her hand, reviewing Peter's application

MRS OLGA KOMAROVA. Good morning, Peter. How are you today?

PETER. I am fine, Madam Komarova. Thank you.

KOMAROVA. Peter, you have applied for the position of Resource Development Officer in the Office of Planetary Management. You are a recent graduate of university and have completed your two years of required military service. This will be your first permanent position.

I see from your résumé that you performed quite well as a seaman. You could have continued in the military. Why did you not choose to do so?

PETER. I found the work challenging and interesting, Madam Komarova, but I found the long postings to be difficult. Military service involves short-term postings, and a lot of relocation. Most of the seamen in my unit were serving their required time, like me. Not many were long term. I would prefer a land position, where I can have a permanent home and a stable family life.

KOMAROVA. I can understand that. Tell me about your military work.

PETER. Yes, Madam. I spent most of the time on the La Plata River between Uruguay and Argentina, on river patrol. I was attached to the Regional Outpost in Colonia del Sacramento. Our patrol boat monitored the river, and escorted supply ships. We patrolled from Punta del Este to Mercedes.

KOMAROVA. Did you see any action?

PETER. No, Madam. Things were stable there. The duty was routine.

KOMAROVA. You did well at university. Your degree is in wildlife management. I can understand why you found river patrol limiting.

Tell me, Peter, why are you interested in this position, Resource Development Officer, and why here, in Astoria?

PETER. I read about the plan to restore the Interior Plains in North America – to reestablish the prairie, to reintroduce the bison, the wolf and feral mustangs on a large scale. To me, that project is worthwhile, and I would like to be a part of it. With my training in wildlife management, I feel that I can make a significant contribution to this effort.

KOMAROVA. Why do you think that this project is worthwhile?

PETER. Before the war, the United States did much to destroy the Interior Plains. They destroyed the prairies, replacing them with massive farms. They wiped out the bison – both the plains bison and the woodland bison. They exterminated the grey wolf. They fenced in the prairie and plowed it. They pretty much wiped out the feral mustangs, which had added a lot to the continent and to human society on it. They destroyed the prairie grass and they destroyed the prairie. Before that, the Interior Plains of North America were a magnificent natural wonder. In my view, it is worth restoring. It can be restored, and I would like to help bring that about.

KOMAROVA. What do you think of Russia's population policy?

PETER. I am not sure what you mean. My political views are conservative. I support the law. I support that policy.

KOMAROVA. What is your understanding of that policy?

PETER. I know the basic tenets.

KOMAROVA. Can you describe them to me?

PETER. Certainly. The main tenets of Russian population policy are the following:

1. There shall be no cities of population over 100,000, except perhaps in Russia.
2. There shall be no use of energy other than current solar energy, except in Russia.
3. All waste shall be recycled.
4. Permanent settlements may be located only within three miles of rivers that are navigable from the ocean.

KOMAROVA. That is correct. What are the major implications of that policy?

PETER. Basically, it is designed to keep global human population low. More specifically, it means that all interior land in the world may be used only by nomadic people, who exist by hunting and gathering. It also means, basically, that Russia is the only high-technology nation in the world. It is the only place where large cities may exist and nuclear power may be used. Outside of Russia, human activity is limited to subsistence agriculture along ocean shores and the banks of rivers that are navigable from the ocean.

KOMAROVA. Why the three-mile limit, along the ocean shore or river shores navigable from oceans?

PETER. So that all permanent settlements may be reached by Russian patrol boats. Such as the one I was on.

KOMAROVA. You have a correct understanding of the basic policy. Do you know why that policy exists? Why should Russia want to keep global population low?

PETER. Before the war, Earth's population stood at over eight billion people. Industrial production had destroyed much natural habitat and seriously polluted the land, oceans and atmosphere. The industrial activity of large human numbers, enabled by use of fossil fuel, was destroying the biosphere and threatening human existence. Most of the eight billion people on the planet lived in poverty, deprivation, desperation and want.

There was no longer sufficient land for everyone. There was no free land anywhere. The planet was so crowded that only the wealthiest were able to access its natural wonders. A few people were fabulously wealthy. Most people lived in cities, many of more than a million people. The cities were plagued by crowding, disease, violence and crime. Many people worked in large factories at meaningless, repetitive, mind-numbing jobs. The work had little direct relevance to their survival – its purpose was to produce wealth for the planet's controllers. For most human beings, life was a living hell, with no hope. In the United States, almost one percent of the population was incarcerated in prisons, many for terms over ten years.

When the war occurred, Earth's population plummeted to less than a billion, in just a few months. Russia was the sole remaining large high-tech nation. Its policy was to establish a planetary management system that would stop further massive change to the biosphere and assure long-term survival of the human species. Basically, the policy is to allow a single high-technology nation – Russia – and to limit energy use outside of Russia to current solar energy. That means that the world outside of Russia is low-technology – hunter-gatherer in the interior of continents and primitive agriculture along oceans and large rivers that flow to oceans. Russia's role – its purpose and mission – is to operate a long-term-sustainable planetary management system. This system keeps global population at low levels.

KOMAROVA. How did the pre-war situation arise? A planet stuffed with billions of people living in misery. That is hard to conceive.

PETER. The global economic system was a system in which most people engaged in meaningless work to produce vast wealth for the planet's controllers. The system produced a global population consisting of a very small proportion of very wealthy people, a small proportion of people of modest means, and a very large proportion of very poor people. The system was committed to growth, both of the population and industrial production. As the total population grew, the number of desperately poor people increased, but so too did the number of wealthy people and total wealth.

Through industrial production of food, the economic system enabled the population to grow to very high levels, so that most people on the planet no longer had access to an amount of land of size or quality sufficient to provide a good quality of life for their family, using natural methods such as hunting, gathering, herding or farming. Most people were slaves to the economic system, sentenced to lifetimes of meaningless work. For most people, the situation was hopeless. The most that they could hope for was to claw their way a little higher up the in the teeming mass of desperately poor people. They either worked within the system, or they perished. The global economic system was all-encompassing. It consumed the entire planet. There were no alternatives.

KOMAROVA. The poor outnumbered the wealthy by a tremendous factor. Why would they put up with such a cruel system, comprised of so many poor and so few well-off?

PETER. It is not entirely clear. Partly out of fear of the unknown. Partly because the global economic system encompassed the entire planet –

there was nothing outside the system, there was nowhere else to go or to seek refuge. Partly because they were brainwashed by the system into believing that a better life was possible only through the system, that by working harder within it and for it things would get better. They evidently did not realize that as the global economic system grew, and human population grew along with it, it was in fact crowding the available space with ever more people and destroying the biosphere.

Enslavement. Indoctrination. Ignorance. Fear. Inertia. Evil leaders. Human greed. All of these things were factors. I'm not sure I understand why it happened – history tells how, not so much why. Perhaps it was destined to happen. Perhaps mankind had to pass through that terrible phase, to have the wisdom to change things for the better.

KOMAROVA. Peter, everything that you have described about the global economic system is negative. It is difficult to accept that a global system could exist for very long at all, if it had no positive benefits associated with it. Do you have anything good to say about it?

PETER. Well, the first thing that I would say would be that it did not last very long at all – a few hundred years. Compared to the timespan of human existence, that is but an instantaneous blip. Second, a growth-based economic system is an exponential process. Exponential processes are like explosions – they do not last very long. Without a mechanism to stop the exponential growth, the system was bound to self-destruct. Third, the large global economic system did in fact produce a very positive benefit – the tremendous explosion of knowledge that it made possible.

Without a substantial economic surplus, society does not possess the wherewithal to support its thinkers – its mathematicians, scientists and philosophers. The economic system enabled us to acquire a good



understanding of the universe and our place in it. This would not have happened had human society continued as hunter-gatherers, or even as primitive agriculturalists and herders. The economic system did not serve only the wealthy – it served all mankind in enabling the acquisition of a massive amount of knowledge in a short time. The fact that it brought about an extreme distribution of wealth, and caused billions to live in poverty and deprivation, is the cost that had to be endured for this very significant benefit to happen.

Without the incentive for acquiring wealth, the wealthy would not have worked hard to build the global economic system and make it grow. Without the massive amount of wealth generated by the system, the means would not have been available to support the science establishment. The suffering of the poor, who generated the wealth, was not in vain – what you see today is the direct result of their contribution.

In short, the global economic system was not all bad. It was causing substantial destruction of the biosphere and therefore could not continue long. But before its collapse it did enable mankind to acquire great knowledge. The universe appears always to evolve to greater complexity. The rise of the global economic system may have been inevitable. Its collapse surely was. In any event, its existence was very useful to mankind. It enabled us to set up the current planetary management system.

KOMAROVA. The present system includes both hunter-gatherers and primitive agriculture. It appears that mankind's problems started with the move to agriculture. Do you see a role for agriculture outside of Russia? Or just hunting and gathering?

PETER. Primitive, household-level agriculture, such as practiced by individuals or small tribes, is reasonable. It can lead to a meaningful

and happy lifestyle. The system that generates much poverty and hardship is the use of agriculture to support a large number of people. The controllers then keep the farmers working full time to produce food for as many people as possible. This arrangement keeps the farmer in poverty, deprivation and hardship. Industrialization and commercialization of agriculture are extensions and implementations of this concept. As long as the agricultural product is used only by the people who raised it – by their immediate families or local communities – there is no problem. It is when it is attempted to use the agricultural product to support other people, remote from the producers, that the problems begin.

To answer you directly, I see a role for household-level agriculture, but not for commercial agriculture, outside of Russia.

KOMAROVA. I am afraid that we got a little off track. I had originally asked what happened to change things, to get rid of the economic system that had such a grip on the planet. What in fact happened to change that? What is different now?

PETER. Well, the war changed everything. It gave Russia the opportunity to set up a well-functioning and biosphere-friendly planetary management system. The situation is radically different from before. There are now no cities of size over 100 thousand people, anywhere on the planet, even in Russia. Economic poverty is unknown. Disease and violence are at low levels. Prisons are gone. Public shaming or shunning is used for minor offenses, and banishment is used instead of capital punishment for serious offenses. Most people on the planet lead meaningful lives. All people have access to land and water, if they want it. Outside of Russia, there is no private ownership of land.

No one is required to do any job that he objects to. If he is not satisfied, he can leave, strike out on his own, leave Russia. If you don't like things now, there is an alternative – you can leave. There is a whole, empty planet you can go to, if you wish. Everyone in Russia now is there because they want to be. They are, in general, happy. Most of the world outside of Russia is empty. We have reset the biosphere to the way it was prior to the industrial revolution – a limited amount of agriculture and the interiors of most continents occupied by hunter-gatherers.

KOMAROVA. Your description is accurate. Do you know how the population policy is implemented, enforced? How is human population kept low?

PETER. Yes, I do know. In the military, we were trained in enforcement. The Russian military establishment possesses a strong navy, air force, and army. We have nuclear-powered and nuclear-armed cruise missiles that can reach and destroy any large city. We have nuclear-powered ships that access the shores of all continents. We have river craft that can reach all permanent settlements. We have nuclear-powered and solar-powered drones that can support global communications and aerial photography of the entire planet.

KOMAROVA. You have certainly done your homework, Peter. You have a good understanding of the current planetary situation, how it developed, and Russia's role in operating a planetary management system that can assure a long-term-sustainable biosphere and human society.

From what we have discussed, I believe that you are a strong candidate for the position. You appear to be enthusiastic about the project, and you have the education to be able to contribute to it. As you know, the purpose of this interview with me is for me to meet you briefly. You

will now continue with in-depth interviews with other staff members, for the remainder of the day. Good luck!

PETER. Thank you very much, Madam Komarova, for the opportunity of meeting with you. Good-day.

## Scene 12. Empire of the Summer Moon Redux

SCENE. The time is 500 years in the future. The location is somewhere on the Great Plains of the United States. It is evening. A man and wife are seated in front of a teepee, in native costume. It is early evening. A buffalo robe lies nearby.

MAN. Wife, how was your day today?

WOMAN. Dear, it was a good day. The children played. I spent some time with Mother. We had a good talk. I worked on your shirt. I have finished tanning the leather and am ready to cut it to size. I can take the size from your old shirt, or modify it if you wish.

MAN. The old one fits fine. Perhaps make the neck a little looser.

WOMAN. OK, I will do that. How was your day? Did the hunt go well?

MAN. Yes, very well. The buffalo are plentiful. We killed one, but then the herd bolted. We chased them for a while, but we did not want to tire our ponies. We will go out again tomorrow. I need to fletch more arrows.

WOMAN. The meat that you brought back is good. I cooked some of it for this meal, and will dry the rest.

MAN. Good.

[A pause in speaking.]

WOMAN. Where did you get the rabbit?

MAN. Just before we got back to camp.

WOMAN. Who got the buffalo hide?

MAN. Don arranged the hunt. The hide is his.

WOMAN. Autumn is approaching, and we could use another hide.

MAN. OK, I will arrange the next hunt. The next hide will be for you.

[The two remain silent for a while, drinking.]

MAN. Our life is very good. The game is plentiful. It is good to be free, to be able to go anywhere on the plains, any time we wish.

WOMAN. Yes, life is very good.

[They remain silent for a while.]

WOMAN. Did you hear that two agents came by today? A man and a woman.

MAN. No, I did not know that. What happened?

WOMAN. It had been several months since an agent had visited, and they wanted information on what had happened since then. It was the standard questions about where we had camped, how plentiful the

game was, and whether we had had any encounters with strangers. We told them about the ruckus last month, and they asked for details on it.

The woman wanted to know about health. She asked about any health problems we had had. She then examined those who agreed. She asked each of us how happy we were. We told her that we were very happy.

MAN. Was that all?

WOMAN. No, they asked, as usual, whether the tribe wished to send any child or children for education.

MAN. And what was the answer?

WOMAN. We said not at present, but if a child were orphaned it would be considered.

MAN. Are they still here?

WOMAN. No, they are gone now. Before they left, they asked whether anyone wanted news from outside. We said yes, and they told us much. Someone asked about the old times, and they told us about that. Did you know that evil people once destroyed all of the buffalo?

MAN. I had heard that once, but I did not believe it. We cannot live without buffalo. We would have perished. Do you believe that?

WOMAN. Yes, I believe that it is true. The prairie was empty.

MAN. But there are plenty of buffalo. Millions of them. Everywhere. That belies what you say.

WOMAN. What happened is that a great man, Lord Vlad, conquered the evil men who destroyed the buffalo. A few buffalo remained in special places, and Lord Vlad reintroduced them to the plains. Along with the ponies.

MAN. Well, if that is true, then bless you, Lord Vlad.

[End of Sample.]

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