State Scientific Center
of Russian Federation
VNIIgeosystems

"Dubna" International University
of Nature, Society and Man

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NATURE–SOCIETY–MAN:

SUSTAINABLE DEVELOPMENT

Summary

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Preface

Dear readers,

Given below is a summary of the book "The System Nature–Society–Man: Sustainable Development" published by the publishing house "Noosphere" in 2000, 1000 copies.

This work is the result of a long-term study designed to explore a problem of current interest – **sustainable development in the system NATURE–SOCIETY–MAN.** The contents of the book is included to allow the readers to grasp the magnitude of the issues under study.

The concepts presented in the book define Nature–Society–Man as a unified Global system that evolves in Time and Space to interact continuously with Cosmos.

This work is the first attempt ever made to establish:

– a direct relationship between sustainable development and the laws of the Global system Nature–Society–Man;

– a logic of transfer to sustainable development in ecology, economy, finances, politics, education.

It was shown that **being no subject to economic or political systems the forthcoming global changes** will effect every country and man.

The changes will be caused by **increasingly extending space-time frontiers of the habitat and space colonization.**

Intellectually stimulating this book holds rewards of many kinds for both the lay audience and specialists.

We will be happy to cooperate with you.

Sincerely,
The authors

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Author of 200 scientific works.

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Born in 1941.
Doctor of Technical Sciences. Full Member, Russian Academy of Natural Sciences. Scientific supervisor, Development of dynamic models "Sustainable development of a state" (in the 1980s).
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SUMMARY

> The answer to questions that remain unanswered is that they should be put otherwise.
>
> *Hegel*

1. The urgency of the problem

The history of mankind saw many global and local crises, conflicts and wars. However, none of those has ever **brought our civilization to the verge of extinction** or turned the Earth's **limited dimensions** into an acute scientific issue.

In the absence of **a consistent unified theory** the existing notions that some countries are steadily developing appear to be **scientifically ungrounded and strategically**

misleading as they fail to account for global evolution laws and space-time prospects.

There are **two space-time prospects:**

1) **The Earth is a closed system and the only place to live in.** This postulate implies **the limits of development** which, in their turn, give rise to genocidal ideas (one of these is that only one "golden" billion of people is worthy of living on the earth).

2) **The Earth is an open system and everything living on it is a cosmic phenomenon.** This postulate implies sustainable development both on the Earth and in Space.

As there is no room for mistake here, it is most important to understand the following: "What is the global system we live in? How does its development sustain itself?"

In 1987 the 42nd Session of the UN General Assembly approved the concept of sustainable development prepared by the International Environment and Development Commission. Today, thirteen years later, scientific reports and UN official documents provide little, if any, evidence of any change for the better. The world is experiencing a global system crisis. Despite all the efforts exerted by the world's community there are **no signs of improvement to be observed in the near future.**

In 2002 UN plans to hold the world's summit and, naturally, to pose the question: **Why, despite all the efforts, no significant progress has been made to ensure the sustainable development of the world's community?**

Given below are eight key points that allow to grasp the enormity of the problem. We are attempting to demonstrate that politicians, lawyers, economists, financiers, ecologists **will not be able to resolve this problem until a proper scientific "tool" is devised to explore and design sustainable development.**

2. Eight key points that allow to grasp the essence of the problem

1. **"Lack of money".** If so, how then can you explain the fact that Nature has been producing air, water, produce, energy, materials over billions of years without spending a single cent. **Why nature does not complain about the lack of money but is very sensitive to our thoughtless actions?** Do we understand the language Nature speaks to us? Can we express our actions and decisions in Nature's language?

2. **"It is not clear if the world's financial market is a force that tends to facilitate or inhibit sustainable development?"** How can the financial market be capable of facilitating a sustainable development whereas it is not capable of predicting sustainability-related financial implications?

The market lacks a reliable environment analyzer to verify its actions for compliance. Unclear is a mechanism

required to protect investments against inefficient management risks in the course of transition to sustainable development.

3. **"Politics is to blame for its shortsightedness".** But how can politics can have a clear vision as long as a financial information it relies upon is so discouragingly inaccurate. Again, there is no reliable analyzer.

4. **"People are said to be poorly aware of the problem".** But how can they be well aware if the system nature-society-man in which we live **is torn, in our minds, into pieces by the Tower of Babel of professional languages.** Thus, not only politicians, economists, financiers but scientists and engineers as well have found themselves in a predicament. Rather than bringing people together professional languages have begun to isolate people and make the problem all the more difficult to understand. None of professional languages can be used to answer the question: "How do all "the pieces" make up the unified system?". We should ask ourselves: "In what language shall the system be described? Do we understand its laws?".

5. The International Environment and Development Commission stated: **"We can ensure that human activity comply with the laws of nature"** to effect transition to sustainable development.

However no explanation was given as to **how** and with which laws we need to ensure compliance. It was assumed that **each country and region would independently develop its own concept** and program.

13 years passed but questions remain as the problem is of both regional and global origin.

6. **The paradox.**

There are fundamental laws of conservation. But what does sustainable development have to do with them? Any development implies a change in "something". But how can "something" keep changing and be steadily conserving itself (i.e. not changing) at the same time?

There are fundamental laws of transformation one of which tells that **the world is moving towards chaos.** Another one states that **we are moving to noosphere, Reason. So, what where is the world's community is heading for: chaos or noosphere?** Which law of nature shall we use to answer this question?

Any man, nation or living system appear to be hostages to their origins:

1. **ACCUMULATION** of free energy,
2. **DISSIPATION** of free energy.

Life is accompanied by these two conflicting origins: the state of **development** is dominated by the first origin, and the state of **degradation** – by the second one. But is there any third origin that is in control of these two?

The conclusions made by the Brundland Commission comply with the necessity of removing **the after-effects** caused by dissipated free energy: it is necessary to clean one's garbage. And to clean less one has to consume less which calls for energy-saving technologies. For the latter to be

developed certain organizational and financial restructuring shall be effected. However, financiers seem to be in no hurry to support this restructuring. Why? Strange as it may be but **none of the text-books on philosophy, mathematics, physics, economy or laws contains the description of the laws of nature with which humans shall comply to ensure sustainable development.**

The well-known laws of conservation are valid for **closed** systems. However our world of living nature, including Man and mankind, is obviously an **open** system.

Is there a law of conservation that is valid for open systems and underlies the two fundamental principles identified above?

If there is no such a law the global sustainable development can not be ensured even though all countries succeed in establishing their individual programs.

7. The Earth, Man, Mankind as well as any living system are undoubtedly open systems that exchange energies with environment at all times. Nevertheless, all predictions have been made by using closed-type global system models to come up inevitably with **limited growth.**

Yet, **limited in space and time,** the Earth has limited energy resources. Their ever increasing consumption when the amount of radiant space energy hitting the earth is not increasing is bound to cause **a critical situation** of cosmo-planetary scale.

8. It is exactly for these reasons that we put the question: **"Are there laws of mankind historic evolution?"**

If such laws **exist**, then it is necessary:

– to show how these laws are related to fundamental laws;

– to show how these laws manifest themselves throughout the mankind's history and specifically during crises, conflicts, wars;

– to present these laws in such a way that would allow human activities in all fields of knowledge to comply with them.

If there are **no** laws of historic evolution it is always possible, as was shown by the great I. Kant, to prove the validity of directly opposing statements, which is to say that we accept any, even opposing, viewpoints with regard to human evolution. There are neither right nor wrong opinions here as well as there are **no progress made towards better understanding of how to ensure sustainable development.** Subjective management strategy shall inevitably clash with Law which manifests itself in a global system crisis.

Hence, **there is a scientific problem (sustainable development of the global system) the resolution of which will define the fate of the earth's civilization.**

Is the mankind faced with the challenging task of making the impossible possible?

We are well aware that **new and innovative ideas** are to be generated to allow us to unravel the web of questions related to sustainable development.

3. What objectives were identified?

1. To present "nature, society and man" as a unified system.
2. To lay scientific foundations of sustainable development.
3. To establish major logical principles to design sustainable development of the nature-society-man system.
4. To evaluate global transformations that are required to effect a transition to sustainable development.

4. What problems shall be resolved?

1. To identify a problem as a whole and relationships between problems in natural sciences and humanities.
2. To establish methodological ground rules to allow for the synthesis of natural sciences and humanities as a single unified scientific system.
3. To develop the set of universal and sustainable quantities that allow the nature-society-man system to be evaluated.

4. To establish scientific basics of universal language that allows nature, society, man to be described as a unified system.

5. To define the notion "Law of nature" in universal quantities.

6. To explore and define, in universal and sustainable quantities, laws of conservation and transformation for living and abiotic nature.

7. To identify laws of mankind historic evolution in sustainable quantities and describe their analytical relationship with laws of nature.

8. To express the notion "sustainable development" in terms of universal quantities and describe its relationship with laws of nature and historic evolution.

9. To express major scientific notions and definitions used in different fields of knowledge (ecology, economy, finances, politics, laws, education) in terms of universal and sustainable quantities and show their analytical relationships with sustainable development.

10. To develop methodological ground rules to allow for sustainable development to be designed for any social systems. To identify global transformations that are required to effect a transition to global sustainable development.

5. Scientific discoveries that underlie our work

The above problems could not have been addressed without considering scientific discoveries the most critical of which are as follows:

1. Lagrange–Maxwell **law of conservation of power** (1788, 1855).

2. Bauer–Vernadsky **principle of sustainable non-equilibrium** (1934).

3. Kronn **tensorial principles of power invariant transformation** (1934).

4. Maxwell–Bartini **system of space-time quantities.**

Paradoxically, **these discoveries are still little known.** However, we dare to maintain that without them there would have been no law of conservation valid for open systems, or evolution principle for any living systems. It would have been impossible to establish a single unified system of universal and sustainable quantities and analyze any scientific domain as an individual coordinate system projectively related to Space-Time invariants. We would have been unable to identify types of real world's systems and relevant laws and rules of transformation. And the synthesis of natural, technical sciences and humanities in the nature-society-man system as well as sustainable development would have had to wait for these discoveries to be made.

Once overshadowed by dominant schools of thought some **ideas** may remain unclaimed until their time comes to

bring them forward as lucid revelations on the frontiers of science. That is exactly what happened to the above discoveries.

6. The structure of the book

The book consists of two interrelated parts. Part I is an attempt to **substantiate** universal laws of Nature, Part II describes how these laws can be **applied** to effect a transition to global sustainable development.

In **Part I** we refer to main definitions and principles to interrelate laws-quantities of philosophy, mathematics, physics, chemistry and biology, i.e. to complete an entire cycle of natural sciences. Special consideration is given to binding **quantities** that are responsible for a unity of quality and quantity. It is shown that relationships can be maintained throughout the entire cycle of natural sciences only if there are compatible quantities expressed in terms of Space-Time. These are shown to be **universal** which allowed to explicitly identify "commeasurableness" of relationships between fundamental notions and laws of natural sciences. This allowed to describe the content of the notion "general law of nature". It is shown that there may be as many laws of nature as there space-time quantities expressed in invariant form. Their dimension appears to determine space-time boundaries of the types of real world's systems, and hence, the boundaries

of laws' application. Much attention is paid to laws of conservation and transformation for both abiotic and living nature. Their "common" and "individual" features as well as application boundaries were identified.

The outcome of Part I were postulates of existence, interrelationships, conservation, sustainable/unsustainable development of abiotic and living nature.

Part II describes how laws of nature tend to effect the evolution of the global system "Living nature-Man-Mankind". Attention is focused on identifying links between fundamental notions in systems. **Laws of mankind historic evolution** were explored with the aid of universal and sustainable quantities to show their analytical relationships with laws of evolution of living nature. The notion "sustainable development" is defined in terms of universal quantities to demonstrate its connection with laws of nature and Mankind historic evolution. The basic notions of ecology, economy, finances, politics were studied. They were described in universal and sustainable quantities to reveal their analytical connections with sustainable development and laws of Nature.

The outcome of Part II was **a logic of designing** a sustainable development, i.e. establishing a set of transformations that are consistent with laws of natural-historic evolution of living nature (including Man and Mankind). This allowed to study **global transformations** that are required to effect a transition to sustainable development of economy, science, education, politics, laws.

The Attachment addresses the question: **"How does Space-Time works?** It is shown that **sustainable development is ensured by the moving 5D Space-Time** that is responsible for all phenomena of life as a cosmo-planetary process.

7. The novelty our approach

Our methodology is geared to sustaining a development of the global system.

1. Back in the 15th century Nikolai Kuzanski related the notion "MIND" (mens) with the notion "MEASUREMENT" (mensurare) to allow scholastic arguments to be settled. It is only through measurement that we can relate the surrounding world observed (explored and described by us in natural language) to the world of natural sciences that are used to record the results of our exploration in mathematical language.

Therefore our work is based solely on the notions that can be expressed in terms of sustainable quantities. This approach is known in science as **the principle of observability.** All notions are expressed not just in sustainable quantities but **in terms of universal, space-time quantities.**

2. There was used **Kronn's tensorial analysis** the major postulate of which is: **"Whatever its complexity, a system can be described by a simple equation. Deriving the**

equation is intellectually most challenging task. Once derived the equation allows the power of the tensorial analysis to take over".

The essence of sustainability and transformations of the global system nature-society-man is expressed in terms of laws of nature.

All laws of nature are described in terms of sustainable universal space-time quantities. This approach is known in science as principle of **invariance.**

3. **The system nature-society-man is studied as COSMO-PLANETARY, open, dynamic, undulating, non-equilibrium system** to identify both its internal and external bonds (with cosmos).

The law of conservation of power is used as an invariant of the global system.

This law appears **to "pierce"** the entire system nature-society-man **through all its micro-, macro- and super-levels.**

4. All major notions of the system nature-society-man are a group of transformations with an invariant **power.**

The names of the invariant expressed in notions of different branches of knowledge are **its projection** onto **an individual coordinate system.**

The invariant is manifested in:

– **philosophy** – categories TIME-SPACE, REST-MOTION, etc.;

– **mathematics** – notions of COORDINATE SYSTEMS, INVARIANT, etc.;

– **physics** – magnitude, laws of conservation, etc.;

– **chemistry** – exo- and endo-thermal photometrical reactions;

– **biology** – metabolism, reproduction, etc.;

– **ecology** – notions of RESOURCE CAPACITY, stocks, losses, etc.;

– **economy** – notions of COST, LABOR PRODUCTIVITY, PROFIT, etc.;

– **finances** – notions of ASSETS, etc.;

– **laws** – notions of LAWS of LAW, LAWS of NATURE;

– **politics** – notions of POWER, MANAGEMENT.

5. The authors consider **DEVELOPMENT of SOCIETY as a creative process geared to effect the direction and velocity** of free energy fluxes (useful power) in SPACE and TIME. **These transformations are effected through a realization of human ideas.**

6. **The development consistent with the Laws of the global evolution of living nature and mankind historic development is referred to as sustainable, and the one inconsistent with these Laws – as unsustainable.**

Sustainable social development (chrono-integral historic process of sustaining development) is a steadily increased flux of free energy which is ensured through creation of new (more efficient) power sources, machines, mechanisms,

technologies and management systems that preclude the manufacture of unwanted products.

Quotations from the book

1. Four billion years ago the **first** cosmo-planetary "critical point" was formed on the Earth to evolve into life. Bound to pass through the **second** cosmo-planetary "critical point" in the foreseeable future, Mankind shall be prepared to meet the challenges of Space Era.

2. All conflicts in nature are caused by a fight for power sources. In human society "power" is represented by monetary circulation, and conflicts are transformed into a fight for money. **The fight for power and the fight for money are two names of the fight for DOMINATION.**

3. There is a lot of talk about famine, poverty and hardships experienced by billions of people on our planet. But nothing has been done to protect people against the alchemy of finances. **Six billion people inhabiting our planet have become hostages to the printing press.**

4. A complete life support system can be designed on the basis of its space prototypes developed for manned space missions. **kWt-hour will become the measure of cost, and money – certificate of useful power.**

5. Sustainable development can not be ensured without scientific support and personnel training which are actually two components of the same logical process – **designing of global sustainable development.**

6. "When I hear someone's complaint about lack of money I translate it as **lack of intellect.** And mind you, what sort of complaints are made by all members of government". (Bismarck)

8. What results have been obtained for the first time ever?

1. Nature, society and man are represented as a unified system in which natural, technical sciences and humanities are interrelated into a single process of exploration and designing of the future world on the basis of fundamental laws expressed in universal and sustainable quantities.

2. Sustainable development has been scientifically substantiated on the basis of the system nature-society-man.

3. There is proposed a system of universal and sustainable space-time quantities to take measurements of the processes explored by natural, technical sciences and humanities.

4. There were developed the basics of a universal language to describe fundamental issues of philosophy, physics, chemistry, biology, economy, finances, ecology, politics, laws, education and other branches of knowledge related to the unified system nature-society-man.

5. A system of laws of nature was established in terms of invariant space-time quantities. Their application domain was defined for the system nature–society–man.

6. Laws of conversion and transformation for abiotic and living nature were established in terms of universal and sustainable quantities. There was derived an equation with different boundary conditions for dissipative, anti-dissipative and transitional physical, chemical and biological processes.

7. Laws of Mankind historical evolution were studied with the aid of universal and sustainable quantities. They were shown to have analytical connections with laws of Nature evolution, as well as crises, conflicts, wars.

8. The notion "Sustainable development" was identified in terms of universal and sustainable quantities. They were shown to be related to laws of Nature and Mankind historical evolution.

9. Major notions of different branches of knowledge (ecology, economy, finances, politics, laws, education) were expressed in universal language with the aid of sustainable quantities. They were shown to be analytically related to sustainable development.

10. There were established basic notions and logical rules to design sustainable development that are valid for all forms of social systems. They were used to identify global transformations that are required to effect a transition to global sustainable development.

9. What was achieved?

1. It seems that we managed to get a clear picture of extremely complicated and confusing notions and principles of natural sciences and humanities that are employed to study development in the system nature–society–man.

Until now sustainable development has been considered essentially from the viewpoint of humanities and described in the language of philosophy, politics, laws, ecology, economy but never in the language of natural sciences. This was caused by many factors the major one of which was that **sustainable development was never substantiated from the point of view of natural sciences.**

The lack of scientific evidence was above all due to:

– Lack of **knowledge** of universal and sustainable quantities that tend to unite natural, technical sciences and humanities into a single system.

– Lack of **understanding** of the laws of conservation and transformation of this system.

– Lack of **skill** required to apply laws of nature to estimate the results achieved in any branch of knowledge.

The lack of scientific support for sustainable development **caused** human habitat to face a global system crisis that threatens to turn into a catastrophe.

2. **This work is but an initial attempt to substantiate scientifically sustainable development.**

We managed:

– to show that **there is a fundamental problem.**

– to identify causes that prevented the problem from being scientifically substantiated.

– to give a general definition of the problem as well as its versions for every branch of knowledge.

– to demonstrate the relationship between these problems.

– to outline a technique that can be used to analyze and synthesize the system nature–society–man.

– to identify basic components of language, axiomatics and rules of inference in the system nature–society–man.

– to identify major logical principles that are necessary to design sustainable development in the system nature–society–man

10. What is the practical application of the book?

Learning the logic of designing the future world will make the lay mentality more receptive to transformations that are to be effected in the third millenium.

Here we are dealing with unprecedented transformations the world community **will have to effect** in order to survive when passing through "critical points" of cosmo-planetary scale that have been specifically addressed in this book.

Bound to effect every country and man the transformations will call for joint efforts to be exerted by the

world community. Facing new challenges is **a matter of joint concern or, in other words, space liturgy.**

Hopefully, **the scientific tool** described in this book might be helpful in dealing with this "matter of joint concern".

11. The appeal

Being aware of the forthcoming danger of genocide that threatens to exterminate most of the human race in the conflict of Confessions, we appeal to the world scientific community and leaders of all Confessions. We believe that this danger can be removed through joint efforts consistent with **the WILL of CREATOR.**

Different Confessions have different names for CREATOR who is referred to in this book as REASON. In his pursuit of knowledge man aspires to comprehend the will of providence and in doing so, he needs help from Confessional leaders.

In the hope of this support we suggest that the World Summit 2002 consider the question of HUMAN RIGHTS that are consistent with CREATOR'S WILL.

Although not destined to see these RIGHTS realized in our lifetime, we are hopeful that other, better and cleverer, people will continue with our work to make our life support system more and more REASONABLE.

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