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ENVIRONMENTAL EDUCATION IN BULGARIA: INTERNATIONAL BACKGROUND AND KEY TRENDS

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Abstract. Content analysis of international and national documents on the state of the environment and environmental education reveals the human efforts to achieve sustainable development through competent management of the relationship with the environment. The paper presents topic developments of the Environmental Education, EE as reflected by the newsletter *Connect*, the interrelationship between global environmental issues and world possible solution measures. A conceptualization of Sustainable Development, SD and Environmental Sustainable Development, ESD is proposed. Some objective needs for further development of EE are discussed. Students' evaluation of nature's effects on their personal development is surveyed and the results are presented. Historical trends of EE as reflected in the four world conferences are outlined and on its background the main aspects of EE in Bulgaria are summarized. Conclusions on further trends in EE development are briefly pointed out.

Keywords: global environmental problems, international & national trends

In order to be effective, the new model of environmental education should answer the global state of the environment, the needs of society for sustainable development, the readiness and needs of students and should continue the traditions, created throughout its historical development.

Environmental education is a real and urgent social need

Global community recognized the need of initiating and continuously developing environmental education at the United Nations' Conference in 1972 (Stockholm) "On the Human Environment" and formulated its decision in recommendation 96 of the final document: "The organization of the United Nation system, especially UNESCO (to) take the necessary steps to establish an international program in environmental education, interdisciplinary in approach, in-school and out-of-school, encompassing all levels of education and directed towards the general public, in particular the ordinary citizen living in rural and urban areas, youth and adult alike, with a view to educating him as to the simple steps he might take, within his means, to manage and control his environment"(ISEE, 1987). This program contains the first full description of environmental education (EE). The day of the Conference opening – 5th of June, was declared as

an International Day of Nature Conservation and EE. The EE events follow the organized activities for conservation of the environment (Table 1).

Table 1. Leading international activities

On conservation of the environment	On environmental education
1972: UN Conference on the Human environment, Stockholm. **1980:** World conservation strategy of living resources for sustainable development of IUCN, UNEP, WWF	**1975:** International Environmental Education Program (IEEP). **1977:** Intergovernmental conference on environmental education in Tbilisi. The Tbilisi Declaration: The role, objectives & characteristics of EE.
1987: Our Common Future – THE World Commission on Environment and Development (WCED)	**1987:** "Tbilisi + 10" – UNESCO's congress on EE and training in Moscow. International strategy for action in the field of EE for 1990's
1992: UN conference on environment and development in Rio de Janeiro (UNCED); Earth Summit; Agenda 21	**1992:** Second world congress on education & communication on environment & development in Canada (1982 First Congress in Canada)[1)]
2012: "Rio + 20"; UN conference on sustainable development – "The future we want".	**2012:** "Tbilisi + 35" Environmental education for sustainable development; ESD – Education for sustainable development.[2,3)]

In 1972 UNESCO undertook a survey on the needs and priorities in order to gather the necessary information and to use it as a basis for developing an effective strategy for EE by sending a questionnaire with 177 questions to 136 states. The analysis of the received answers revealed the great interest and approval of the preparatory activities for an International Program on EE (Connect, 1976). All states declared the need for environmental educational programs, funding and trained teachers.

The survey contained ten educational sectors covering all levels of education and training from pre-school to out-of-school adult education and to general educational system. The problems of EE were grouped in seven areas: legislation, funds, instructional aids, physical facilities, personnel, organizations and programs.

The first issue of UNESCO-UNEP environmental education newsletter Connect (1976), was published in January and since then it has been continuously assisting development and implementation of the International Environmental Education Programme (IEEP).[4)] Regularly, every 2-3 years, the content of the program undergoes analysis and updating, followed by recommendations for the improvement of the national environmental education programs. As part of UNESCO, courses for training of teachers, key

specialists and inspectors in the field of ecology and environmental protection, have been periodically organized.

Each activity helped to enrich and extend the concept of EE, to clarify its philosophy and its practical implementation. International conferences and congresses on EE united world community, expanding the scope of issues discussed, increasing the number of publications as well as the number of states and organizations developing EE (Table 2).

Table 2. UNESCO's newsletter *Connect* and environmental education

UNESCO's topics on EE	**Year and issue of the Newsletter**
1. Discussion on biennial and triennial IEEP of UNESCO.	1976-1; 1978-4; 1980-4; 1983-4; 1985-1; 1986-1,2; 1987-2,3,4; 1989-4; 1992-1
2. Concept, aims and objectives of EE	1977-1979 in more than 30 issues
3. Recommendations for improvement	1982-1,3; 1995-3
4. Development & improvement of national strategies	1979-1,3; 1980-1; 1982-4; 1989-3;1990-3; 1991-4; 1992-4; 1993-1,4; 1994-3;
5. Science and environment	1976-3;1978-3;
6. National reports on EE	1979-1; 1983-1; 1989-1,2,3,4; 1990-3; 1994-1,2;
7. International conferences and symposia	1976-1; 1977-2; 1979-71984-4; 1987-1; 1992-2; 1993-3; 1994-1; 1995-4; 2002; 2004; 2009; 2012
8. Pilot projects	1978-2;1981-2; 1994-1; 1995-2;
9. Regional meetings and declarations of environment and education	1997-1,2; 1979-1,3' 1980-1,2,3; 1981-3; 1983-3; 1984-1; 1986-4; 1988-3; 1989-1,2;1990-2; 1991-23; 1992-11993-2,4; 1994-2,4;1995-3,4, etc.;
10. Global environmental problems	1988-4; 1989-1; 1992-4; 1993-1; 1994-2;
11. Experience of Bulgaria	1979-3; 1982-2;1983-1; 1988-2; 1989-1; 1989-1;

Using the newsletter *Connect,* the international community shared information on teaching and learning, exchanged regional experience in developing teaching aids and training personnel as well as school curricula and programs (Table 3, Fig 1). It is very likely that the largest number of publications in 1991/1992 was due to the preparation of materials, clarification of problems and concepts, dissemination of ideas and decisions and implementation of recommendations, worked out in the proceedings of UN conference in Rio de Janeiro (The Earth Summit). For twenty years (from 1972 to 1992) the

global community had accumulated both rich experience and great number of problems in EE as well as in creating and solving environmental problems. The interaction of humanity with the environment is not a piece of knowledge to be taught and learned in a single subject, as some educators still advocate, but a continuously developing theory and practice, encompassing all unique characteristics of: the different individuals and communities, the different levels of organization of nature from atoms to the whole Universe, the different historical experiences and behaviors accumulated throughout the long evolution of humankind. It is not an end in itself, but a growing and developing new philosophy on lifelong education and new understanding of human lifestyle and culture. Environmental problems will continue to increase in scope and depth and will induce the incessant development of EE to ESD and beyond.

Table 3. Publications in Connect on conceptual clarification and teaching of EE

77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
1	5	42	26	32	14	67	40	36	47	12	31	55	42	116	116	38	46

Note: The first row represents the successive years starting from 1977 till 1994; the second row represents the number of publications.

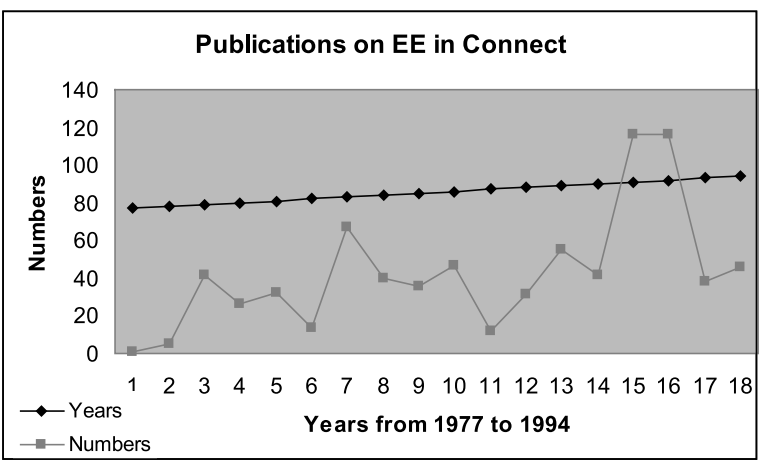

Fig. 1. Representation of the growing interest in EE

From 1997, with the re-vitalization of "Project 2000+" (1994)**,** the scope of Connect was broadened to cover science and technology education. Since then the contents have been divided into seven areas: Lead article devoted to a specific theme; Reports

of UNESCO activities relating to Science, Technology and Environmental Education (STEE); Reports of worldwide activities in STEE; STEE Centres, Networks, Associations; Doing it and Telling it: featuring teaching/learning initiatives of readers; News and Publications; Viewpoint: featuring letters to the Editor.

Each issue of Connect helps EE throughout the world although the environmental literacy of humanity does not rise significantly. This is because each generation should learn ecology for itself from the beginning and should acquire environmental literacy on its own.

The international bibliography[5)] on EE contains hundreds of topics, discussing different aspects from philosophy, organization, planning and collaboration to assessment and evaluation and shows that these topics are still relevant (Table 4).

Table 4. Some topics on EE, discussed in *Connect*

Year	Topic and issue in brackets
1976	The Belgrade Charter – A global framework for EE (1)
1977	Regional meetings in the context of IEEP (1); From Stockholm to Tbilisi (2)
1978	Tbilisi Declaration and 41 Recommendations (1); The IEEP 1979-1980 (4)
1980	European conference on EE (2); The IEEP 1981-1983 (4)
1981	Interdisciplinarity in EE (3); Teacher training in EE (1); Pilot projects in EE (2)
1982	International EE since Stockholm & Tbilisi (1); Out-of-school EE (2); Problems, trends & prospects in EE (3); World problems & Unesco's M-T plan (1984-89) (4)
1983	The problem-solving approach of EE (2); Actions of the IEEP (1975-1983) (3)
1984	Publication of the IEEP (1); EE at the university level (2); Evaluation of EE in schools (3); Youth and EE (4)
1985	Tenth anniversary of the Unesco-UNEP IEEP (1975-1985) (1); Simulation & gaming for EE (2); EE & the arts (3); Social sciences & EE (4)
1986	The IEEP 1986-87 (1); EE in technical & vocational education (2); Environmental values & EE (3); Micro-environments for EE (4)
1987	EE & the rational use of natural resources (1); Moscow's Unesco-UNEP international congress on EE & training (3); The IEEP 1988-89 (4)
1988	The message for the media: EE 91); Sustainable development via EE (2); Urban problems & EE (3); Natural disasters & EE (4)
1989	Environmental literacy for all (2); Developing an EE curriculum (3)
1990	Environmentally educated teachers, the priority of priorities? (1); Basic concepts in EE (2); Planning EE at the national level (3); UN cooperation & coordination in EE (4)

1991	From awareness to action via non-formal EE (1); A universal environmental ethics-the ultimate goal of EE (2); EE for university students (3); Incorporating EE into industrial education (4)
1992	The IEEP 1992-93 (1); Environment or development – a false alternative (3); Biodiversity: an increasingly important theme in EE (4)
1993	Teaching global change through EE (1) Reorienting school curricula towards environment & development (2); UN cooperation for the development of EE (3);
1994	Environment & population education & information for human development (1); Water: an educational & informative approach (2); Desertification: EE to the rescue! (3); Population: working for an equitable, sustainable development in harmony with the environment (4)
1995	Social development: for the people & the environment (1); EE: Quo Vadis? (2)
1996	Marine biodiversity (1);
1997	The chemistry of atmospheric policy; Project 2000+ (2); The oceans: diminishing resources, degraded environment & loss of biodiversity (3/4)
1998	Non-formal & formal learning interaction for scientific & technological literacy (1); Health-promoting schools (2); Difficulties faced by girls in the study … (3/4)
1999	Science & the use of scientific knowledge (1/2); Food & agricultural education in the 21st century (3)
2000	Sustainable tourism & the environment (1); Visual literacy in science & technology education (2);
2001-2010	Science, technology & mathematics education (1/2); Technology: the god that limps (3/4); International decade for a culture for peace & non-violence for the children of the world;
2003	World science day for peace & development – 10 November 2003 (3/4)
2004	Ethics of science & technology (3/4)
2005	Holistic & interdisciplinary EE; Crafts for sustainable development;
2006	Standards for curriculum-based reproductive health & HIV education programs
2008	How information & communication technologies can support ESD
2009	Informational society & ESD
2010	Technologies for education: potentials, parameters & prospects
2011	Chemistry's contribution to our global future; The greening of chemistry
2012	Technical and vocational education and training (TVET); Building skills for work and life; Global school health promotion; Ethics in science & environmental politics;

In October 1992 UNESCO undertook a survey of curricula of secondary schools, colleges and universities in order to evaluate their environmental orientation. 78% of the interviewed states declared the need of EE and allocated environmental themes with respect to school grades in two versions - a condensed and expanded. At the 7th IOSTE symposium in august 1994, fifty seven of the 110 reports were on EE, i.e., 52%. The surveys showed that EE was a social need for the solution of the environmental problems and an individual need for adaptation and health preservation. The interest in it significantly increased before and after key international events such as the congresses in Moscow, 1987 and Rio de Janeiro, 1992. The advance of topics is a sign of theoretical development and practical implementation of EE.

EE has been growing steadily for 40 years since the first UN conference on the Human environment;[6] its philosophy has been refined, strategies, technologies and techniques have been developed, its implementation in all types of schools and subjects in formal, non-formal and informal education has been expanded. EE has penetrated into the different forms of education of all ages of the population and has become an essential part of life-long education. Nevertheless, the behaviors of people have not become more environmentally responsible, nor more worried about depleting natural resources, nor less consumable and no less destructive to the ecological balance. Where should we look for the reasons of that situation?

Some of the reasons are: complex structure and functions of the environment; the neglect of ecology in the different models of EE; multiple and permanently increasing needs of the world population; severe, complex, evolutionary established and closely intertwined relationships between humanity and nature; exacerbated global environmental problems; rapidly increasing illiteracy; low state of environmental literacy; rising poverty; expanding domination of capital over culture, justice and equality; emerging new technologies, which widen the gap between them and the technical skills of the workforce; not always environmentally evaluated scientific discoveries and seldom scientifically supported environmental actions, etc.

Environmental situation is an objective condition for promoting EE

Global environmental problems are identified as violations of environmental equilibrium under the action of natural causes or human activity. Environmental situation comprises three aspects: a) the characteristics and consequences of global environmental problems; b) reasons for their emergence; c) strategies and technologies to solve them. There is no generally accepted classification of the global environment issues, because they are numerous and mutually interwoven (Table 5).

Table 5. Environmental issues and possible solutions

Environmental issues	Possible solutions
1. Degradation of environment and human health due to agriculture, industry & tourism.	International cooperation for nature conservation: organizations, movements, conventions, programs, agreements, strategies; environmental monitoring, legislation, research, sustainable development & education; environmental forecasting.[7-10]
2. Loss of biodiversity: endangered species and threats to the gene pool.	Global, regional and national strategies on biodiversity; Biosphere reserves, biological control, gene pool protection; Bonn convention on migrating species protection (1983); recovery of species having populations below the critical minimum; Convention on biological diversity (1992); Berne convention on European wildlife (1979); Convention on international trade in endangered species of wild fauna and flora (CITES) (1973).[11-,13]
3. Threatened habitats (ecosystems), destruction of wetlands and grasslands.	Protection of wetlands - Ramsar convention (1971), protected territories and aquatoria, nature reserves, protection of habitats and small islands; Bern convention (1979); World heritage convention (1972); The habitats directive (1992); Technical remote sensing of protected areas (2007); Sites of special scientific interest (SSSI); World heritage; Nairobi protocol; national parks; Antarctic treaty (1991).[10]
4. Global atmospheric change: greenhouse gases, volcanic eruptions; climate change and consequences.	The UN framework convention on climate change (1994); Combating global warming: the climate change convention (1997); Intergovernmental panel of climate change (1997); Reduction of greenhouse gas emissions (Pickering & Owen, 1997) Kyoto protocol; 2012 UN climate change conference - post-Kyoto negotiations.
5. Ozone layer depletion, ozone hole, global warming.	Reduce the production and use of chlorofluorocarbons (CFCs), Montreal protocol on substances that deplete the ozone layer – 9th edition (2012); Vienna convention for ozone layer protection 9th edition (2012).[10]
6. Population explosion: social, political, health, economic, environmental issues, environmental and intellectual refugees, social conflicts, terrorism, organized crime.	Administrative management: legislative approach (restrict large families), lack of housing and health services; Improving people's lives, advocating for women's rights (freedom to work), control of reproduction, reproductive health and family planning programs, one-child policy, contraceptive courses, forced sterilization, abortion, compulsory education for females, forced vasectomy or hysterectomy.

7. Landscape degradation caused by agriculture, tourism, power generation, urbanization, exponential population growth, etc.	Landscape protection; use of comprehensive landscape master plans, reclamation with draught resistant plants, sustainable forest management, technical recultivation, biological rehabilitation, afforestation, establishment of new ecosystems; European landscape convention (2000).[7,8)]
8. Erosion of soil, river and sea banks, reduction of soil fertility; overuse of soil, acidification, salinisation, sedimentation, pollution & increased flooding.	Types of soil erosion & causes. Conservation engineering, agricultural measurements: crop rotation, bench terraces, contour tillage, assessment of erosion risk. Conservation of soil through international law: a perspective from the IUCN commission on environmental law (Berlin, 2011 international meeting – preparation for Rio + 20); Declaration of principles on sustainable use of soil (debated in Iceland).[8,9,14)]
9. Reduction of arable land due to the pressure of human activities: soil erosion, desertification, industrialization, housing, pollution, overgrazing, deforestation, nutrient depletion, etc	Restoration: sustainable practices – farmer (education, experience, concern, etc.), farm characteristics (size, type, tenure, ownership of machinery, etc.), tillage, draining, contour banks, deep ditches, terraces, plowing. European Parliament resolution (march, 2009) on arable land deterioration; The Basel protocol (2000) & convention (2004), UN Convention on climate change; UN Biodiversity convention (2012)[13)]; Convention to combat desertification, Rio de Janeiro (1994).[8,9)]
10. Deforestation: biodiversity loss, global environmental change, timber harvest, conversion to agriculture, road building, fire, fuel; ecosystem services	Forests are managed for multiple uses, to restore as much of possible of natural ecosystem function, and in some cases to attempt to restore "old-growth" or pre-disturbance conditions; re-growing of temperate forests; maximum annual harvest, rotation, direction of forest succession, forest plantation; low paper consumption, recycling, rational paper use, vegetarian meals; UN convention to combat deforestation (2012).
11. Desertification: deforestation, overcultivation, destruction of plants, drought, war, more people, incorrect irrigation	In 1977, the UN Conference on Desertification (UNCOD) adopted a Plan of Action to Combat Desertification (PACD), (1992) & Paris (1994); Greenpeace, World Wide Fund for Nature, Community Forestry International, and Conservation International. Sustainable land-management practices in dryland environments.

12. Pollution: chemical substances, energy, littering, air, soil & water pollution, radioactive contamination, visual pollution, acidification, biomagnification, etc.; Effects: Human health, environment (smog, etc.).	Control of emissions into air, water & soil, pollution prevention, waste minimization, recycling, reusing, reducing, mitigating, preventing, pollution control devices (dust collection systems, scrubbers, sewage treatment, industrial waste water treatment); International convention (C.) for the prevention of pollutions from ships(1973,1997); C. on long-range transboundary air pollution (1979); Oil pollution C. (1954), London C. (1972, 1996); Basel C.; Barcelona C. (1976) of the Mediterranean sea; Sulfur protocol (Oslo 1994, 1998); Geneva C. (1979), etc.
13. Euthrofication: ecosystem syndrome, phosphorous & nitrogen in water, change in animal & plant population, water degradation, algal blooms, death of fish, sea birds.	The European Union's water framework directive mandates strategies to reduce N & P delivery to coastal areas; 2000 national Research council report recommended a National coastal nutrient management strategy for USA; Multidimensional solutions: buffer zones, reduce livestock density, improve fertilizer application, treat urban runoff, reduce N emissions from vehicles and power plants, etc.
14. Wastes: rubbish, trash, unwanted or useless materials, litter, attract rodents & insects, diseases, contaminants, economic costs.	Public education, pay as you throw, recycling, reuse, waste pickers; a global perspective of education and resource management. The Talloires Declaration (Talloires, France, 1990) for sustainability. University leaders for a sustainable future (2010); Environmental & waste management programs, the security of nations; the heritage of future generations.
15. Resource depletion: renewable, nonrenewable; farming, fishing, mining, water & fossil fuels; over-consumption, non-equitable distribution, overpopulation, slash & burn, etc.	New sources of energy, buying products without extra packages, investing in longer lasting products, international cooperation, protected areas, alternation of business practices to obey environmental regulations, eco-friendly goods, solar & wind power, fuel efficient cars, recycling, reuse, energy efficient appliances. Conventions: Antarctic Treaty (1980), Ecosystem Monitoring Program (1985), Helsinki (1992), Montego Bay (1982), Rome (1983), Geneva (1994).[10)]
16. Violation of biogeochemical cycling in ecosystems and the biosphere. Humans throw away tons of garbage every year as unwanted, unneeded, and unusable.	To overcome that it is necessary to: use natural resources and substitutes for scarce mineral compounds; develop and apply closed cycles of production; develop and use energy-saving technologies and new clean energy sources; reclamation after use of deposits; saving and waste-free use of raw materials in production; reuse of materials after the products in use. Biosphere is considered as the most major ecosystems of the planet, supporting the global cycling of matter and flow of energy, both basic for eco-equilibrium.[15)]

17. Natural disasters: floods, fires, droughts, hurricanes, earthquakes, severe weather, tornados, health disasters, etc.	International Red Cross & Red Crescent Movement, Geneva conventions and Geneva protocols (1977, 2005); National Red Cross and Red Crescent Societies: Founded to protect human lives and health without any discrimination; Education for protection from natural disasters.
18. Industrial accidents: chemical, electricity, gases or fire hazards; caused by accidents, negligence or incompetence; accident release, acid rain, mine, nuclear, chemical, explosions, pollution, etc.	Integrated risk information system; Hazardous substances data bank; Emergency response to chemical and biological terrorist incidents; Chemical emergency poison control; Organizations for the prohibition of chemical weapons; The convention of transboundary effects of industrial accidents (Italy, 1976; Switzerland, 1986; 2012). Appropriate emergency planning. National laws, regulations or accepted standards; Active international cooperation.
19. Energy production issues: green house gases, radioactive pollution, industrial accidents, resource depletion, acid rain, soil acidification, land destruction, etc. Lack of awareness, financial constraints and lack of legal enforcement.	Increasing the efficiency and reducing the risks to humans and environment. Reduction in energy consumption and energy demand per capita. Renewable energy, biomass, geothermal, hydroelectricity, solar, thermal, tidal and wind energy. Efficient energy use, electric & green vehicles. Carbon neutral fuel: synthetic fuel (methane, gasoline, diesel fuel, jet fuel). Energy audit, trained professionals, use of telecommuting by corporations and work from home. New behavioral patterns, investment in building renovation, invest money, time and effort in energy conservation. Efficiency standards & labels.
20. Salinisation (increase of water-soluble salts in the soil) & sodification (increase of exchangeable Na): ecological, economic and social consequences; loss of soil fertility, desertification, change of plant community, halophytes.	The reclamation, improvement and management of salt affected soils necessitate complex and expensive technologies; combination of efficient drainage and flushing of the soil by water. Select crops that fit the conditions in the field, give a little more water than the crop consumption, allow leaching of salts below the root zone, keep the right intervals between irrigations, use appropriate fertilizers types, periodical soil tests. Four major strategies: planting of crops, pastures and fodder plants; planting of trees; fencing of land from grazing; construction of earthworks (levees, banks and drains).

21. Urbanization: population migration: labour migration, refuges, undocumented migrants; problems: energy, health cares, sanitation, poverty, pollution, land destruction	Social & political changes of a region, Solutions: enacting growth boundaries, parks & open spaces protection; planning for & directing transportation dollars; reversing government programs and tax policies; revitalizing already developed areas – attracting new business, reducing crime, improving schools; preventing new development in floodplains, coastal areas and other disaster-prone areas.

The list of global environmental problems does not exhaust all individual cases. At the UN conference on Environment and Development (1992) priority was given to biodiversity conservation, and the main reason, causing global problems was ascribed to population explosion and human activity. Every human being needs resources and creates wastes. A person from developed countries uses as much resources as ten persons from developing countries (WCED, 1987). Therefore it comes to methods of production, technology and lifestyle. No less important is the absence of information, environmental ignorance, as well as destruction of traditional culture, uncontrolled urbanization and unchecked use of resources. Every environmental problem exacerbates the rest, and in its turn is exacerbated by them. Deforestation, which is developing very rapidly, causes loss of biodiversity, flooding, soil erosion, climate change, siltation of river estuaries, as well as reduces opportunities for production of electricity, health deterioration and more. It may be a direct consequence of pollution (dying forests from acid rains) and may lead to water pollution (soil erosion), to depletion of resources, disruption of biogeochemical cycling and ecological balance and also to the degradation of the landscape and natural disasters (floods, droughts, fires). Is this knowledge enough to stop deforestation by greedy for money people or by people, brought to the brink of poverty? Both extremes are equally dangerous for nature and for our future.

The links between environmental problems are direct and indirect and lead to intensification of the environmental crisis. At the same time solving one environmental problem relieves solving the others. This correlation is explained by unity of nature. Environmental problems threaten the existence of life; reflect adversely on development and on future generations. Their solution is a matter of life and death.

The causes of environmental problems are natural (earthquakes, volcanic eruptions, hurricanes, floods, droughts) and anthropogenic (domestic and industrial activity, tourism, wars, etc.). Natural factors cause local ecological crises and anthropogenic - local and global. Natural factors are enhanced by anthropogenic and vice versa. Anthropogenic factors measure force with geological and cosmic factors and cause impacts beyond the capabilities of nature to self-regulate. They are rooted primarily in the socio-economic

situations and in inappropriate individual and social behaviors. Wars, that almost always have environmental motivations, deepen environmental crises. As Table 5 points out, the impacts on the environment are caused not only by demographic explosion, but also by contemporary nature unfriendly technologies, industrial accidents, unwise use of natural resources, uncontrollable urbanization and alienation from nature. All of them cause injuries, health problems, deaths and can be ascribed to low environmental literacy due to inadequate education. Nothing can be as expensive as environmental ignorance. Besides, the technical and technological power of humanity has reached enormous dimensions, whose consequences are difficult to predict. Unequal distribution of wealth and expansion of poverty are no less dangerous. People brought to the brink of survival do not think of the rational use of resources and ecological balance. They live for that very day and that very minute. Economical revival is extremely important to fight unemployment and poverty but that means revival of natural resources overexploitation and accumulation of new wastes. The result is a vicious circle from which it is difficult to see the outcome. Absence of environmental regulation has been worsened by the introduction of foreign species, intensification of industry and agriculture, etc.

The environmental situation nowadays is by far not optimistic. The examples are numerous: "The 2010 biodiversity target has not been met at the global level. Despite an increase in conservation efforts, the state of biodiversity continues to decline, according to most indicators, largely because the pressures on biodiversity continue to increase (GBO-3).[11)] The conquest and destruction of habitats for logging, illegal hunting, and other challenges are making conservation a struggle; the contributions of NGOs for solving environmental problems have not brought marked changes, but the fact that there are so many NGOs popping up everywhere perhaps points to failures of international systems of politics, economics, markets, and basic rights; foreign aid or (development assistance) is often regarded as being too much, or wasted on corrupt recipient governments despite any good intentions from donor countries. In reality, both the quantity and quality of aid have been poor and donor nations have not been held to account; privatization of water resources, promoted as a means to bring business efficiency into water service management, has instead led to reduced access for the poor around the world as prices for these essential services have risen; there have been criticisms of corporate social responsibility from ardent free trade capitalists and anti globalization activists/environmentalists alike; energy insecurity combined with other global issues, risks fueling conflict and repeating past mistakes in history; brain drain is a problem for many poor countries losing skilled workers to richer countries."[11)] Sustainable development ties together concern for the carrying capacity of natural systems with the social challenges and is still a dream. The actions in the four domains of economic, ecological, political and cultural sustainability are still being isolated. The UN focused political outcome document[13)] offers clear and

practical measures as well as hopes for implementing sustainable development (Rio + 20, 2012 "Future We Want", UN Conference).

Environmental problems exist in both developed and developing countries, but manifest themselves in different ways. In the former the reason is the uncontrolled growth and in the latter - the population explosion under uncontrolled conditions of economic backwardness. Major cause is the destruction of traditional culture and environmental ethics as well as the development of consumerism. The deepening of the environmental and economic crises can lead to short and long term consequences; the short been low standard of life, extinction of many species, health problems, conflicts, terrorism among social groups, fighting for scarce resources; the long-term result of environmental degradation is the inability to sustain human life. Such degradation on a global scale could imply extinction for humanity.

Sustainable Development Strategy (SDS) is seen as salvation from environmental crisis. The further evolution of humanity is possible if hard limits are imposed on all people regardless of where they live, but that requires cooperation of all nations. Environmental imperatives comprise: ban on violent methods to resolve international conflicts; use of scientific knowledge to address creeping catastrophes; consideration of man, society and the environment as a single wholesome system; evaluating decisions of national environmental problems by relevant international institutions; research for timely prevention of hot spots (dangers of accidents and environmental disasters). They also imply resumption of growth, improvement of quality of growth, satisfaction of basic needs, protecting and enhancing the resource base, reorienting technology and dealing with risk, integration of environment and economics in decision-making, consideration of economic development to the carrying capacity of the environment, the integration of the strategies for SD (Fig 2). Environmental imperatives are international and place restrictions on the activities of the parties, corporations and individuals. New conditions for sustainable development must be created including political, economic, social, industrial, technological, administrative, national and international systems. The new environmental situation creates the need to develop appropriate science disciplines and to open any science to the problems of the environment. Science receives new social procurements.

First is the need to integrate environmental with anthropological crisis. Damage to the environment (ecological crisis) is a consequence of demographic crisis (exponential growth of humanity), crisis in the economy, technology and social policy, mental and physical health of people. It follows that different aspects of education must submit to a single concept - ESD. SD is not a panacea and does not mean a total waste of prosperity and wealth. Ecological balance can be compared with the situation of the elderly, whose life is sustained with medication, but can not be cured. The environment is sick, and the

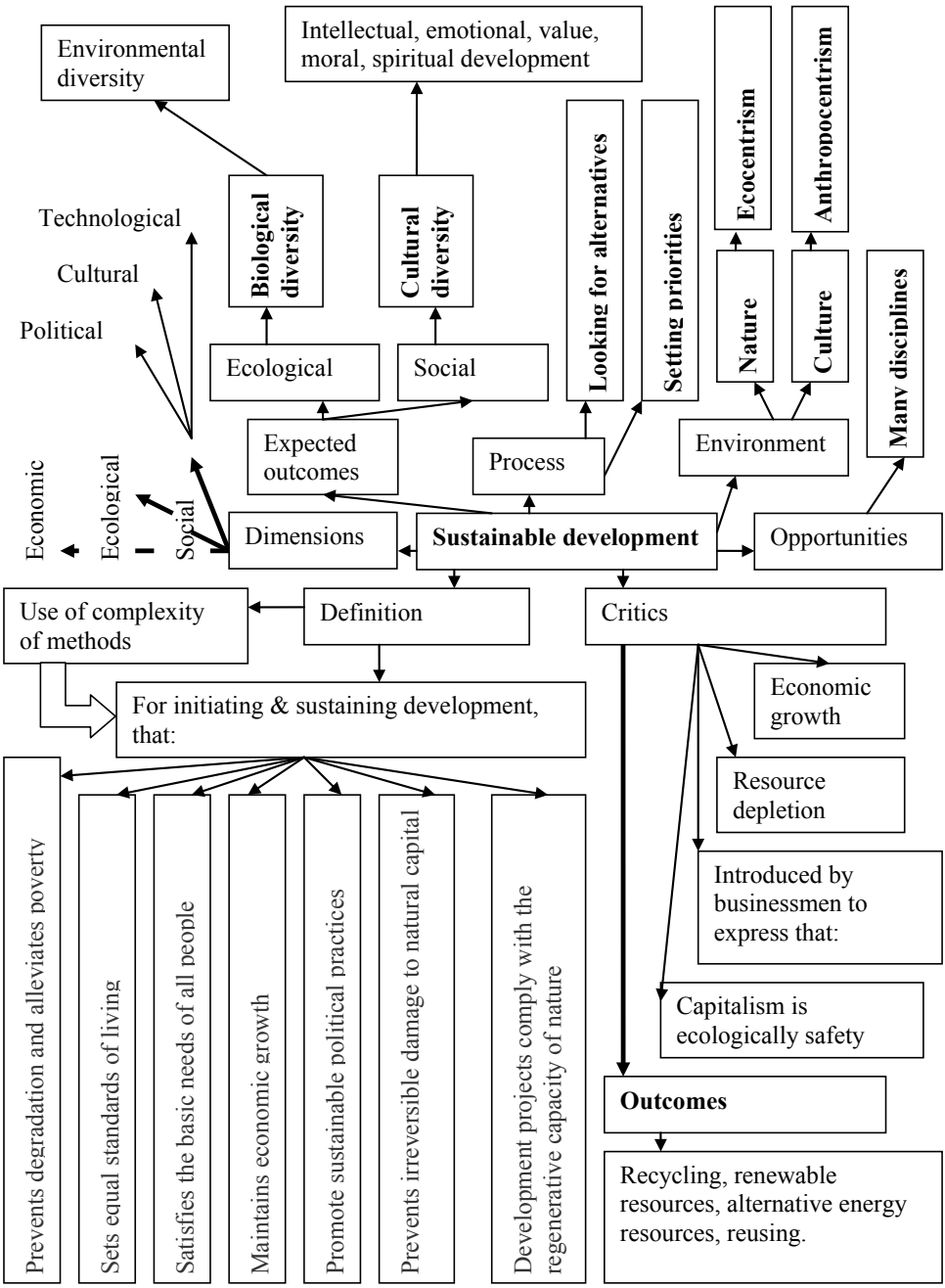

Fig 2. Conceptualization of sustainable development

people's obligation is to treat it with their responsible behavior in order to provide better conditions for their lives and the lives of future generations.

UNESCO's materials characterize ecological crisis as "imperfect understanding of the natural systems and mechanisms which make possible the maintenance of life on earth; disregard of unintentional effects of technology, in particular the various forms of pollution; poor management of soil, forests and water; unbridled consumption of fossil fuel; uncontrolled urbanization; the relegation of the rural population to a marginal position; destruction to the existing background of life; and the crushing of traditional culture" (UNESCO, 1979).

These changes are not new and the international actions being taken to solve them are not new either. New are their dimensions, broadened and deepened by aggression and terrorism. Their characteristics incorporate ecological, social, economic and cultural aspects, i.e., ecologo-anthropogenic.

New science and social development itself create new values that can be utilized by individuals and incorporated in the culture of society through EE.

The emergence and development of education for sustainable development is based on many preconditions

Environmental situation is an important prerequisite for the development of ESD (Fig. 3), but not only.

ESD can give a lot to the student. Human interaction with the environment is a natural law that is deeply rooted in biological and later in social evolution. Studies based on these trends direct learners to maintain equilibrium in the long-term sustainability. Its rise is due to the very human needs.

Some of the reasons to introduce EE and evolve it to ESD

Need for awareness of the environment.

Humans have inborn *orientation reflex* (immediate response) that adapts them to a change in their environment. It helps them to react to novel or significant stimuli, maintain a logical relationship with the environment and survive in the face of sudden changes. However, with repeated introduction of the same stimulus, the orienting response will decrease in intensity and eventually cease. This is called *habituation* and refers to a gradual „familiarity effect" and reduction of the orienting response with repeated stimulus presentations. This natural phenomenon explains the curiosity of children to new environmental situations and the development of tolerance to lasting impaired environment as the environmental situation is reflected in the consciousness. Learning has biological and social prerequisites.

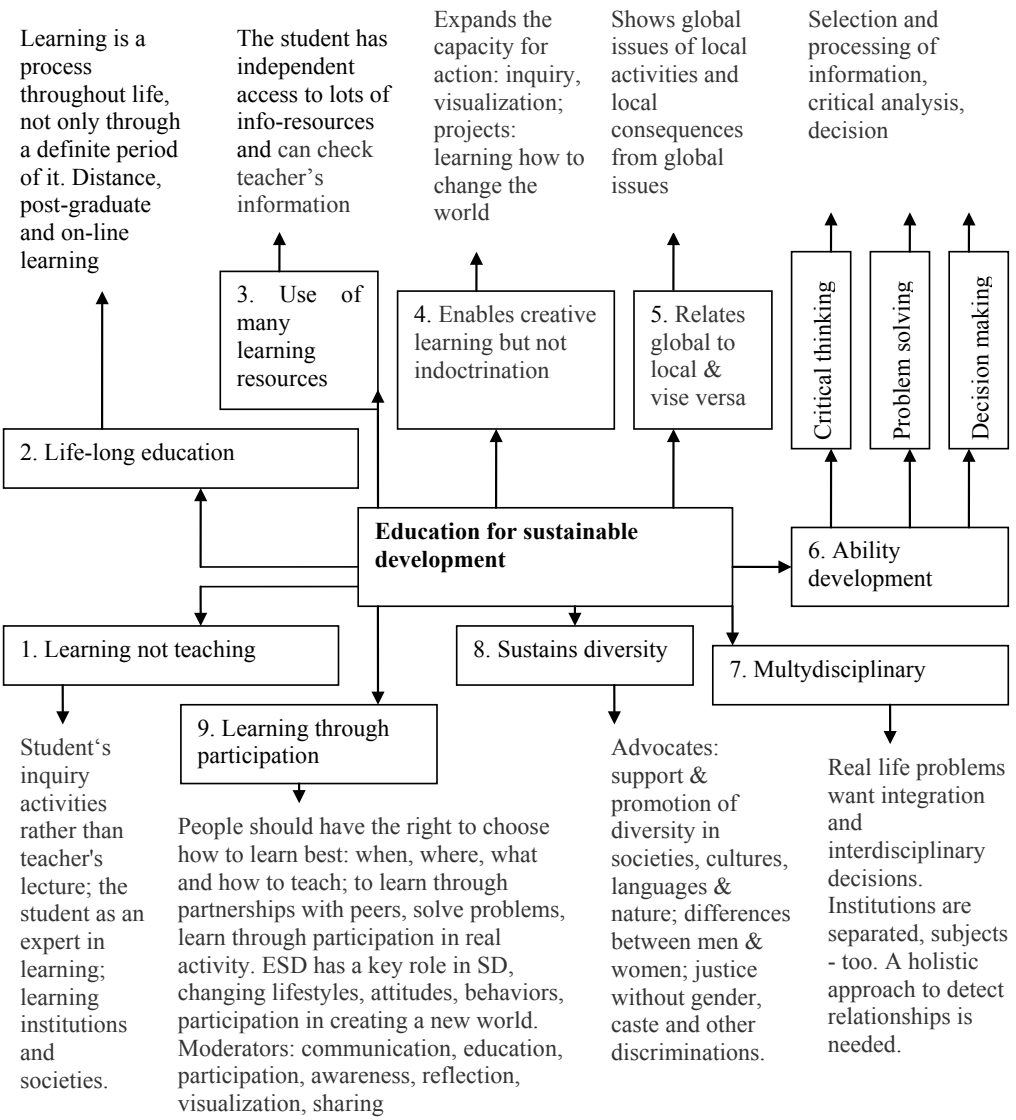

Fig 3. Conseptualization of education for sustainable development

Students living in deteriorated environment lose benchmarks for comparison, become used to degradation and accept it as natural. The environment has multifaceted meanings: it means nature inside and outside of us that has to be valued; it means natural resources that should be managed and used rationally; it implies environmental problems that have to be solved; it means noosphere that should be ruled by reason; it is our habitat, our home, our work and our ecological niche, requiring care; it is the biosphere in which we coexist with other living creatures as components of ecosystems; it is a community in which we collaborate to develop projects for improving the quality of our environment. Nonetheless it is comprehensive and integral.

Need for competency to solve environmental problems

Environmental problems are pressing and do not allow delay. They are interrelated and can be understood from many angles with the help of complex approaches. Social development requires solving environmental and demographic problems underlying the civilization crises. Sustainable development needs integration of activities and competences that in their turn are the result of systematic training. Nevertheless, they should be formed on sound scientific ecological basis. Modern ecology is a complex science integrating fundamental and applied branches and in this way building up the scientific basis of sustainable development. Compliance with environmental laws and economic development in accordance with the capacity of the environment are priority imperatives (Constanza et al., 1992).

Conflict between nature's integrity and multiple approaches to study it

The biosphere is a global unified system of integral ecosystems. Each ecosystem is subjected to external disturbance and retains its integrity through structural and functional relationships among its components. Each scientific discipline as well as each school subject studies only a single component and cannot give a wholesome picture of the ecosystem of which humans are only a part. Therefore EE in its present conceptualization as ESD opens the opportunities to integrate knowledge and to motivate all people for multisector partnerships in sustainable use of an ecosystem bearing in mind its relationships with other ecosystems in the biosphere. The different spatial, temporal and hierarchical levels of ecosystem organization are in a dynamic state and can best be studied and understood through the use of two interconnected approaches – a reductionist and a holistic. The former emphasizes the structural aspects and focuses on individual species and population dynamics of species within isolated ecosystems. The latter focuses on macro-level functional aspects (energy flows, nutrient recycling, productivity), paying less attention to historical and evolutionary factors and ignoring most of the details observed at smaller scales of functional organization and of the spatial and temporal distribution of organisms (De Leo & Levin, 1997).

Need of greater attention to human values in education

The global processes of development rely on human values. Humans are the only living beings that create values and behave according to their set of values. Nature has its own values for human existence and that is why attitude to it is an essential part of human values. Physical, social and psychological wellbeing of humans depend to a certain extent on environmental quality. The environment should be regarded as nature that must be valued, respected and protected. The gap between nature and people need to be removed. EE restores our sense of belonging to nature and explores the links between identity, culture and nature. It is through nature we find our identity as human beings among all other creatures. With EE we learn to appreciate the bio-social diversity. Besides that nature has other values as well – aesthetical and scientific. In order to meet these requirements all people should be environmentally educated starting from nursery and continuing throughout life. Three value bases for environmental concern have been outlined: self-interest, humanistic altruism and biospheric altruism (Schimel et al., 2007). Values influence our environmentalism because they act indirectly on our decisions about the environment (Dietz et al., 2005; Kirpal, 1991; Gupta, 2000).

Need of harmony between physical and psychological development of students

The phenotype is the result of the interaction of the genotype with the environment. Therefore the development of student's personality requires interaction with his/her environment, which is physical, biological and social. It also requires interaction with the environmental problems, having different origins – natural or anthropogenic. Contacts with nature are very essential for the physical development and healthy wellbeing of children as well as for a harmony in their psychological development and relaxation from stress. Social environment is indispensable for the personal development of any individual and exercises its influence on his/her physical and psychological wellbeing. In EE, natural and social environments are integrated and used for the physical and psychological development of children as well as adults.

Development of students' skills for independent decision-making requires social activity

In ESD students study real environmental situations that threaten life on the Earth. Students under teachers' guidance explore environmental problems; make discussions, expeditions, observations, experiments, surveys; perform practical work for studying, cleaning and protecting nature. Students collaborate and develop not only scientific skills but also social skills in applying scientific knowledge to the solution of social issues. ESD offers new opportunities for interactive learning and the development of environmental competencies.

Reconstruction of education in accordance with the new European and global trends presses the necessity of ESD

Changes in life science and social needs require educational reform. A new way of thinking and behavior is inevitable to establish SD. Environmental challenges call for new environmental education programs. ESD itself gives new impetus to education reform that provides social continuity of life. Socio-ecological systems are intimately linked in ways that we are only beginning to appreciate. Furthering the research agenda on such systems poses great methodological challenges. Human societies respond to environmental signals through multiple pathways including collapse or failure, migration and creative invention through discovery. Thus ecological context introduced appropriately in the different disciplines will improve students' understanding of life events (Garcia-Martinez & Serrano-Torregrosa, 2011).

ESD emphasizes the responsibility of man and society to comply with ecological laws that underlie the ecological balance, the healthy lifestyle and SD. It is a process that continuous throughout the whole life of a person (life-long education), because of the continuous development of environmental situation, ecology, psychology and pedagogy, building up the scientific foundations of education. Environmental competencies are needed to prevent environmental degradation.

Collaboration between people on the planet for dealing with environmental issues needs EE ESD is the link of the present with the past and the future. The movement for the conservation of nature unites all people of the world regardless of nationality, religion and ideology. The overall goal of the UN Decade of Education for Sustainable Development (DESD) is such a broad endeavor that it calls on individuals and stakeholders at all levels – local to international – to be involved. Governments, civil societies, NGOs and business/industry can and should have a role. Activities addressing the environmental crisis urgently require integration of scientists from different disciplines to develop strategies to address global environmental issues; integration of administrators and executives to implement practical programs for the management of resources; integration of scientists, educators, administrators and teachers to create a specialist on environmental issues and foster environmental literacy, environmental awareness and behavior as well as environmental competencies.

International environment goals can be met by well educated and trained people in the field of ecology

Such people are prone to show responsible behavior towards the environment. They will try to avoid creating new environmental issues and solve already existing problems on a scientific basis. Not a single agreement, convention, protocol or whatsoever environmental

decision can be attended to ignorantly because environmental situation is very complex. According to Gardner (1983) students possess different kinds of minds and therefore learn, remember, perform, and understand in different ways. The theory of multiple intelligences poses new and broader obligations to EE practices. ESD means including key sustainable development issues into teaching and learning. It also requires participatory teaching and learning methods that motivate and empower learners to change their behavior and take action for SD. ESD consequently promotes competencies like critical thinking, imagining future scenarios and making decisions in a collaborative way. DESD (2005-2014) seeks to meet the needs of the present without compromising those of future generations. SD is a vision of development that encompasses respect for all life - human and non-human - and natural resources, as well as integrating concerns such as poverty reduction, gender equality, human rights, education for all, health, human security and intercultural dialogue. It is to integrate the principles, values and practices of sustainable development into all aspects of education and learning. This educational effort will encourage changes in behavior that will create a more sustainable future in terms of environmental integrity, economic viability and a just society for present and future generations. DESD opens seven areas of collaborative actions: vision-building and advocacy, consultation and ownership, partnerships and networks, capacity-building and training, research and innovation, use of Information and Communication Technologies (ICTs), monitoring and evaluation.

In the system of universal values, the human relationship to nature is at the third place (Caduto, 1985), the first been the relation to himself and the second – to his family (community). Each national culture and religion, each type incorporates its relation to nature. Attitude results from surveying 663 ninth grade students confirm the important role of nature in shaping their personalities (Table 6) (Kostova, 2003).

The results reflect the situation at school and prove that priority is given to knowledge. Students' contacts with nature are not satisfactory nor activities which involve them to protect the environment from destruction.

Our surveys on the students' concerns about nature also show that their attitudes fluctuate between dominant environmental paradigm (DEP) and the new ecological paradigm (NEP), between anthropocentrism and ecocentrism (Kostova & Vladimirova, 2011). The school alone cannot achieve remarkable results if the society does not take serious steps on the road to nature protection on ecological foundations.

These results lead us to the conclusion that it is impossible to achieve crucial changes in ESD and students' behavior if society does not act responsibly on the 39 chapters of Agenda 21 simultaneously. The analysis of the presentations at "Rio+20" (2012) confirm this notion. Program activities for sustainable development seriously leg behind environmental degradation. Exacerbation of environmental issues continues and threatens to go beyond the control of mankind.

Table 6. Students' environmental values (results from a survey)

Question: What does nature enrich you with?	
Nature of the response	%
1. Intellectual enrichment - the study of nature gives us knowledge about the diversity of non-living and living (plants, animals, humans) nature; about the space; the immediate surrounding world; refines our thinking and makes us more circumspect and clever.	34
2. Aesthetic enrichment - nature affects us with its unique beauty, grandeur, splendors, joy, vastness; it wakes up and enriches our feelings - admiration, fear, reverence, contentment, freedom, respect, care, responsibility.	24
3. Physical development - nature makes us healthy, it is our home; we learn to overcome difficulties and obstacles, to apply knowledge in practice, to be useful to society, to show altruism; it provides oxygen to breathe, food, clothing; inspires us confidence in our strength and helps us in our development as individuals; enriches us materially and spiritually; provides everything we need to live and to work.	23
4. Moral improvement - nature makes us more human, more nimble, better, more restrained; inspires love for animals and people; nature makes us free from stress, backs our inner harmony; makes us feel satisfied and relaxed.	9

Implementation of programs on sustainable use of different types of resources requires training of qualified staff, improving the competence, facilities and working conditions, motivating and engaging the public. The realization of Agenda 21 objectives is linked closely to the strategic role of ESD in the development of the overall education system. It helps in the integration of objectives, contents and activities at national and international level. Dominant goals throughout Agenda 21 include formation of ecological literacy, environmental ethics and business capacities. Dominant activities are planning, cooperation of institutions, unity of informal and formal learning using simulations and interactivity. In relation to the environment, priorities are given to resource conservation, sustainable development, improvement of urban life, protection of biodiversity, the unity of environmental quality and life quality (health and environmental aspects of education) and the development of environmental technologies.

Trends and lessons from history are very important for progressive sustainable development in future

Society exists because of genetic and social continuity in its development. One shares responsibilities and dreams not only with his contemporaries, but also with people from the past and the future. Therefore continuous reinvention of the past helps to identify future

trends. History is a source of solutions based on social experience and on already experimented social situations. Human sense of history and ability to objectively evaluate and understand historical events, their drivers and consequences, is the best guide to human values for finding solutions to contemporary global problems in development and education.

Nature study and nature conservation movement

EE began in ancient times with the understanding of man as a separate entity different from the rest of the world, but depending on it. Attitude to nature was developed in two aspects - literary and practical. In folklore, ethical issues (good-bad, right-wrong) were discussed, the aesthetic impact of nature was described and anthropomorphism was used in the explanation of natural phenomena. Fables and moral lessons were used to help students develop an appreciation of nature. Illiterate people explored nature in the practice and tried to explain natural phenomena by superstitions, myths and legends transmitted by word of mouth from generation to generation.

Attitude to nature is reflected in the educational heritage traced back to 6th century BC. Confucius saw learning as a highly personal and therefore, highly individual process of observation of subject matter followed by reflection. „Study without thought is labor lost; thought without study is dangerous."[16] Thales of Miletus gave a naturalistic explanation of the cosmos and supported it with reasons. Socrates, Plato, and Aristotle considered environment studies important for realistic education. Their philosophy was carried into the Muslim world, from which it was reintroduced into the West to form the foundation of medieval philosophy and the Renaissance.[17]

Comenius, Rousseau, Pestalozzi and Froebel (18th - 19th centuries) exerted their influence by helping establish the foundation for a concrete environmental education program Nature study. Pestalozzi's motto "Learning by head, hand and heart" is still a key principle in successful schools. Friedrich Fröbel encouraged pupils' self-expression through play, both individually and in group activities. His ideas were creatively developed by John Dewey (Paunchev, 1902; Tsonev, 1928).

Nature study societies in collaboration with Ministries of education and teachers initiated outdoor forms of nature conservation education such as to set up school gardens and school forests (Kostova, 2003).

German naturalists A. Luben, F. Junge and O. Schmeil introduced ecological approach to Nature study in the late 19th and early 20th centuries by structuring the curriculum around the communities (ecosystems): marsh, river, etc. They also introduced mandatory training excursions and their experience was disseminated in Europe (Paunchev, 1902; Stanchev, 1906).

Nature conservation education continued as out-of-class and out-of-school activities, such as: planting trees on eroded areas; renewal of water pipes; construction of

parks and gardens as well as of wooden "houses" for birds placed in trees, of winter feeding-troughs for wild animals, etc. After the Second World War nature conservation movement and out-of-school activities covered all schools in Bulgaria. The modern EE movement, which gained significant momentum in the late 1960s and early 1970s, stems from Nature Study and Conservation Education.

Nature conservation education in school curricula

In the 60s of the 20th century industrialization and urbanization gathered pace. The machine set a barrier between man and nature and caused alienation from the natural environment. Consumer lifestyle came into being making the situation worse. Pollution, depletion of natural resources and destruction of the landscape became prominent and the environment in highly developed countries deteriorated rapidly. Developing countries, copying the economic and technical model of the developed countries also fell into the trap of the ecological crisis making it global. International movement for nature conservation and EE arose to answer the global interest in the quality of the environment.

A new aim was set in biology curricula: to instill in students love and caring attitude towards nature. Environmental studies were introduced in science education curricula and textbooks. Popular science materials on environment protection were issued to help students. New strategies on biology and physics curricula were set in the U.S. and England. Ecology chapters and ecological approach were introduced in the biology curriculum (Chapter "Organism and environment" in the Biology curriculum in Bulgaria). Environmental education was fragmented and mainly in the subject of Biology.

The world community witnessed several forums on EE: Nevada conference in Carson City, USA, 1970, organized by IUCN that formulated the definition of EE; Ruschlicon conference, Switzerland, 1971, which worked out recommendations for the development of projects and programs on EE; Kroscienko conference of East European countries, Poland, 1972 on the implementation of Rushlicon's recommendations.[18)]

In response to the decisions of these conferences Eastern European countries established research teams to develop the principles of nature conservation education (NCE) under the leadership of the Academy of Pedagogical Sciences of the USSR, which continued its fruitful collaboration from 1972 to 1992. In Bulgaria, the research team was founded at the Research Institute of Education, the Ministry of Education in 1972. The work of Western and Eastern research teams was united by the Commission on Education of IUCN.

World politicians, scientists and educators combined their organizational, research, informational and practical competences in preparing a forum – the Belgrade workshop (1975) that created *The Belgrade Charter*, a global strategy for EE. The 5th parts of the document have not lost their significance so far and sound too up to date. The first part clarified the environmental situation and called for a new international economic order

based on a new concept of development in harmony between humanity and the environment. The second part dueled on the environmental goal, defining the concepts "quality of life" and "human happiness". The core of the document was the third part formulating the goal and the objectives of environmental education with the concepts: awareness, knowledge, attitude, skills, evaluation ability and participation. The target group of EE was the general public within the major categories – formal and non-formal sectors. The fifth part presented the guiding principles of EE programs that have to: consider the environment in its totality, be a life-long process with interdisciplinary approach, emphasize active participation, examine major environmental issues from a global and local point of view, focus on current and future environmental situations, examine development and growth from an environmental perspective, promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems. The Belgrade charter initiated The International Environmental Education Program (IEEP) of UNESCO (Connect, 1976).

The *First intergovernmental conference* on environmental EE: "Education and the Challenge of Environmental Problems" (1977, Tbilisi, USSR) outlined the major environmental problems and their socio-economic and cultural dimensions, defined the role of education in facing environmental challenges, surveyed current efforts for the development of EE and gave priorities to international cooperation. The conference drew attention to the development of theory and research and to introduction of innovations into practice. The Declaration of the Conference emphasized expansion of EE by introducing the problems of the environment in traditional subjects in primary and secondary education, in extracurricular activities, in teacher training and in some courses at university level. The 41 recommendations provided guidance for further development of EE.

The *Second International Unesco-UNEP congress* on EE and training "Tbilisi +10," 1987, Moscow, USSR, revised the progress and trends in EE since the Tbilisi conference and stressed the importance of training of teachers and students in general university education. It underlined the necessity of specialized environmental training and outlined the priorities for EE development in the 1990s adopting the International Strategy for action in the field of EE and training for the coming decade, ISEE, 1987.

The *Third Conference* "Educating for a Sustainable Future", 1997, Thessaloniki, Greece, five years from Rio de Janeiro, highlighted the critical role of education in achieving sustainability, the important contribution of EE, the elements for further implementation of the program of the Commission for Sustainable Development (CSD) and mobilized action at international, national and local levels. The main guidelines were: education for a sustainable future, reorienting formal education towards sustainability, raising public awareness and understanding, shifting to sustainable lifestyles, investing in education and directing ethics, culture and equity in achieving sustainability (UNESCO, 1997).

The Fourth conference on EE, 2007, Ahmedabad, India; "Tbilisi + 30" attracted the attention of humanity to the UN "Decade of Education for Sustainable Development" (DESD, 2005-2014) and underlined the key role of education in achieving sustainable development. Its aim was to bridge the gap between EE and ESD. The development of EE since the first conference, thirty years ago, was examined and a global agenda for the DESD was set. This established a platform for sharing practices and ideas on initiatives in EE throughout the world and transforming it into ESD. Tilbury & Wortman (2004) outlined five characteristics of ESD: *envisioning* (imagine a better future), *critical thinking and reflection* (examine economic, environmental, social & cultural structures in the context of SD), *systemic thinking* (acknowledging complexities and looking for links and synergies when trying to find solutions to problems), *building partnerships* (promoting dialogue and negotiation, learning to work together) and *participating in decision-making* (empowering people). This conference reinforced Agenda 21 of the Earth Summit, 1992.

Agenda 21 is a radical turn in the development of ESD and in humans' relation to nature. Compared with the strategy for protection of living resources, 1980, IUCN, it puts larger and ecologically sounder purposes. It gives priority to conservation of biological diversity, which is the basis for maintaining the ecological balance; preservation of habitats of species, including humans; in situe conservation; resource management for sustainable development; pollution control; sustainable agriculture and rural settlements. Each of the adopted 27 principles for SD has its projection in education. Recommendations for national strategies on ESD and national councils to integrate and coordinate the overall activities have important organizational matters. The development of school strategies on ESD can make students more effective and more responsible participants in national programs. Chapter 35 gives priority to science in sustainable community development to expand capacity and human resource development and chapter 36 outlines the framework of the ESD long-term strategy.

Review of EE in Bulgaria over the years until today

Modeling of EE has undergone three stages

The first model incorporated the following components: definition of EE; goals, aims and objectives; approaches and principles; ecological and nature conservation ideas, concepts and facts for different school disciplines; organizational forms, methods and techniques; integration of the methods of teaching with the methods of up-bringing (value development); context and equipment; EE characteristics for each school level and for each type of school; organization & management; contacts & cooperation of the school with other institutions & business agencies (Kostova, 1987). The second model was represented by "Unified system of environmental education, training and culture in

Bulgaria", which attempted to reform the EE by constructing a system from kindergarten to postgraduate qualifications, i.e., lifelong learning (Kutov, 1984). The third model is based on the theories of target models and constructivism. It attempts to highlight the scientific basis for successful learning and consists of three constructs: didactic, ecologically conceptual and technological management. Each construct is composed of specific components and thus solving specific educational tasks (Kostova, 2003).

Aims and objectives of teaching in EE have undergone deep changes

Before 1989 the objectives of EE were subject to communist upbringing (1979) consisting of the following values components: intellectual, moral, aesthetic, physical, health and occupational. For example participation in school forest activities helped to foster in students a love and caring attitude towards the forest, to build skills, work habits and responsible behavior in this area. The main goal of EE was building ecological culture, consciousness and behavior (1980). EE purposes updating was based on an analysis of the environmental situation, of community behavior, of objectives in UNESCO documents, of declarations and recommendations of international forums and on an analysis of the objectives set out in other countries. In addition the concepts ecological culture, consciousness and behavior were theoretically elucidated (Kostova, 2003).

Environmental consciousness includes four components: ecological and environmental knowledge, self-consciousness, goal setting, attitudes (intellectual, humane, hygienic, aesthetic, economic, value). Each component contains cognitive processes, personality formations and behavioral manifestations.

European Environment Agency (EEA) noted that „despite more than 25-years of Community Environmental Policy – which has been successful in its own terms – general environmental quality in the EU is not recovering significantly, and in some areas it is worsening…That situation & the fact that the unsustainable development of some economic sectors is the major barrier to improvement," EEA, 1999. This assessment indicates the need for constant updating of ESD goals, especially their core components (competencies and values). The goals of the new model of ESD consists of five components (personal capacities acquired as a result of ESD) of eco-consciousness for: a necessity of information (cognitive component); value prioritization (value component), duty and responsibility (moral component), a capacity for action (action component) and a capacity for management (controlling component), all aiming at sustainable development (Kostova, 2003). European community needs highly skilled experienced specialists, ICT engineers, IT business analysts, specialists with cross-disciplinary skills, etc.

Goal operationalization was achieved through the development of state educational standards (2000) that are now at re-conceptualization.

A system of nature conservation and ecology concepts had been built in all subjects (natural science, humanities, technology) in direct relation to curriculum content and were better structured in biology

The system of the environmental concepts closely related to core concepts in nature study for the primary school and in biology for the secondary school was improved; a system of moral and aesthetic concepts of nature was built in literature. Glossary of the most important terms of nature conservation education, developed by the research team of the Eastern European countries, was published for use by teachers and educators, 1978. For high school students an integrated course „Man and Environment" was built, 1979. The system of ecological and environmental concepts was structured around six integrating ideas underlying the violation of basic nature laws. The integrating ideas are: a) *population growth* (human population grows exponentially against the capacity of the environment); b) *energy budget of the ecosystem* (nature uses scattered solar energy but humanity - concentrated energy in fossil fuels); c) *management of the ecosystem* (ecosystem is a unique structure of the biosphere with a very delicate balance, resulting from succession of biocoenoses; human population violates the trophic chains and pyramids in the ecosystem); d) *cycle of matter* (the cycles in nature are waste-free, but the productive activity of humans ends with waste substances excluded from the natural cycles); e) *biodiversity in nature* is the basis of the ecological balance (mankind strives for uniformity by growing monocultures; diversity - biological, social and cultural, ensures development); f) *behavior of organisms* is adaptive in nature but human behavior is destructive (Kostova, 2003). To help students and teachers, a dictionary of ecology and environmental protection with 1800 terms was prepared (Kutov, 1984). The system of ecological and nature conservation concepts is continuously under improvement in the process of curricular and textbooks updating. "Attempts to synthesize understanding from interactions between organisms (biotic components), from interactions between organisms and their abiotic environments, and from the interplay between both of these, however, are what make ecology unique" (Kinne, 1992).

The strategies for EE have been developed in correspondence with the leading educational theories, mainly constructivist theory

A scientific approach to teaching introduces students to the stages of scientific research and forms in them seeking spirit and skills to solve problems of everyday life and be active participants in nature conservation, 1980. The reflexive approach to teaching makes students look critically at people's behavior to nature and evaluate their own behaviors from the point of view of nature's balance, 2004. Interactive learning puts students in a situation of communication, sharing and collaboration, which is indispensable prerequisite for solving environmental problems. Learning is a social activity, and the student is a social product.

Educational technologies, including organizational forms and methods of teaching, have been continuously under development

Educational technologies include organizational forms and methods of implementation of the educational process. These are focused, organized, structured and supervised educational impacts/incentives of the cognitive activity of students. Organizational forms and methods are selected depending on the educational goals, curriculum, learning time, school facilities, students' age, experience, interests and capacities, 1976. Most of them are the same for the teaching of all school subjects with some differences in the vocational schools. In Bulgarian didactics organizational forms are classified into *class-lessons*, based on the curriculum (lessons for introduction, new knowledge, reinforcement, revision and summary, practical skills, assessment and evaluation; session seminars, laboratory exercises; field trips; role playing, etc.), *extracurricular* (ecology club, workshop on ecology and environment protection, expedition, excursion, school conferences, school festivals & holidays devoted to nature) and *out of school* (environmental societies, eco holidays, competitions, nature trails, conferences, summer camps, exhibitions, school forests, school gardens, tourist clubs, commands "Green Patrols" and "Blue Patrols", children ecological complexes, etc.). Out-of-school activities were supervised by the Central station of young technicians and agrobiologists, established in 1959 and dismissed after 1989. In Bulgaria more than 230 school forests having 22000 participants were built up to 1988 that do not exist anymore. Some new forms of learning were introduced: expert learning, school conferences, ecological practice, simulations, role plays, business games, trainings, Olympiads, case studies, photo sessions, computer supported interactive learning, etc. (Kostova, 2003). Nowadays out-of-school activities are organized by the National Palace of Children according to a program approved by the Ministry of Education, Science and Youth.[19)]

The methods were classified into three groups: *verbal* (narrative explanation, lecture, discussion, explanation, description, reading & theoretical analysis), *visual* (observation, demonstration) and *practical* (experiment, practical exercises, modeling). The idea was to make a multisensory approach to learning involving speech, image and action, or rather the two hemispheres of the brain when combining the methods in the ecological lessons (1983, 1988). Some new methods are brain storming, survey, interview, test analysis, presentation, team work, project method, classification, prioritization, port folio preparation, content analysis, etc. (Kostova, 2003), computer-based learning, solving interdisciplinary environmental problems, 2011.

Educational techniques are specific activities and learning tools within a teaching method

For example educational techniques employed in lectures are: mind map construction, audio and video presentations, multimedia, questioning, choral response, mental break, prompting with a picture, personalization of the class, encouraging students to ask and

to formulate a response, voting for a concrete thesis, response cards, call up associations, reflexive communication, labeling illustrations, fill in blanks (a brief summary of a lecture with blanks to fill), fill out a questionnaire with yes and no; voting for and against, reading and commenting, etc.

Interactive techniques used in field observations are: work in small heterogeneous groups, collaboration, coaching, empathy, group discussion, reflection in pairs, sharing in the group, asking questions, descriptions of observed facts & phenomena, reflection "What I learned from the book of nature", etc., 2003.

Teacher training and qualification in EE is a continuous process, which takes place in universities and in courses, organized in districts and schools

The first programs for teacher qualification in EE were prepared and approved in 1981. Teachers having a master degree from the university continue to develop their professional skills through regular and part-time training for obtaining five qualification degrees, fifth being the lowest and first – the highest. Teachers' professional competences have been improved in the courses preceding the introduction of the new curricula. Teachers' guides accompanying each textbook provide teaching examples of the topics on the syllabus.

Some teachers are enrolled in doctoral programs and conduct research to solve educational problems, thereby also increasing their teaching qualifications (Vladimirova, 2012). Besides these, numerous local, national, regional and international conferences, symposia and workshops promote dissemination of information and exchange of experience. Free internet access also facilitates the dissemination of information and advances in science and education.

University level EE is very well built in the three degrees – Bachelor of Science, Master of Science and Doctor of Philosophy, as well as the post-graduation qualification on ecology with new specialties and disciplines depending on accreditation of the specific university (Dimkov, 2009).

Education for sustainable development is a government policy and in particular the integrated activities of the Ministry of Education, Youth and Science and the Ministry of Environment and Water. It occupies a significant place in the activities of some NGOs.[20,21)]

Conclusions and future trends in ESD

Despite continued efforts for sustainable development the state of the environment continues to deteriorate. Environmental consciousness of humanity continues to lag behind the growing environmental crisis. It is necessary to achieve domination of sustainability by stabilizing the size of the human population, sustainable use of resources, improving the quality of the environment, multiplying renewable resources and finding

substitutes for non-refundable. The humanity should create and develop environment-friendly technologies in energy, transport, agriculture, construction and should ensure sustainable economic growth on sound scientific bases, ignoring political intrigue and speculations. Future trends in the development of ESD should account for those needs: each school subject should take adequate part in the development of environmental literacy without redundant repetition of topics and threats; each media should stop informational pollution with unscientific statements and unjustified moralizing. Lots of time is dedicated to attribution of properties to goods, most of which they do not possess with the sole purpose to stimulate consumption. Without scientific knowledge students cannot distinguish truth from lie, and are forced to accept either everything as truth or everything as lie. Advertizing is exaggerated and repeated several times daily becomes truth. It deals with everything, even with pain and grief. A partnership between education, business, science, government and non-governmental organizations and the media is needed to ensure scientifically informed action to solve environmental problems. Ignorant people cannot take right decisions and are easily politically manipulated. People never needed so much scientific knowledge as nowadays. It is no surprise therefore that one of the 56 UN recommendations at "Rio + 10" is a call to promote education about sustainability awareness (recommendation 13). "Knowledge is the greatest tool for human progress but it won't suffice – we also need leadership and determination to work together" (Julia Marton-LeFevre, head of IUCN, speaking at "Rio+10" conference). The recommendations of "Rio+10" are good wishes but humanity needs mechanisms and universal commitment to accomplish them; scientifically prepared and thinking citizens, well trained and skillful in the different aspects of sustainable development.

NOTES

1. http://environmental-education.org/en/who-we-are/99-weec.html WEEC - World Environmental Education Congress. In the same 1992, the World Congress for Education and Communication on Environment and Development was held in Toronto, Canada. It was the first major international gathering, after the Rio Conference, to focus on Chapter 36 of Agenda 21, promoting education, public awareness and training. In September 2002, the UN organized the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa to assess progress made in this direction on a worldwide basis.
2. http://www.esd-world-conference-2009.org/en/international-advisory-group/members.html UNESCO World Conference on education for sustainable development. In April 2009 in Bonn was held UNESCO World Conference on Education for Sustainable Development. Bonn Declaration inter alia highlighted the importance of the Investment in ESD as an investment in the future, and as possible life-saving measure, especially in post-conflict and least developed countries. Besides, it evaluated the importance of ESD in 21st century and the progress of DESD (Decade of ESD).

3. http://www.5weec.uqam.ca/EN/ A successful 5th World Environmental Education Congress.
4. http://trove.nla.gov.au/work/27594559?selectedversion=NBD44077019
5. http://www.unesco.org/pv_obj_cache/pv_obj_id_75F7FDFCFACBB6687AD8FA12A415E5800BE50D00/filename/SC_publications_catalogue__Sept_2012.pdf Natural Sciences Publication catalogue 2012-1913.
6. http://www.ibe.unesco.org/en/services/online-materials/publications/educational-innovation-and-information.html Innovations in environmental education.
7. http://www.tropentag.de/2005/abstracts/full/475.pdf Goltenboth, F. Ecosystem approach for landscape rehabilitation – review and perspectives.
8. http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:087E:0128:0132:EN:PDF European Parliament Resolution on deterioration of agricultural land (2009).
9. http://lex.bg/laws/ldoc/2133870081 Law on Protection of Agricultural Land in Bulgaria.
10. http://en.wikipedia.org/wiki/List_of_international_environmental_agreements#Nature_conservation_and_terrestrial_living_resources List of international environmental agreements.
11. http://www.cbd.int/gbo3/?pub=6667&section=6689 Global Biodiversity Outlook 3.
12. http://ec.europa.eu/environment/eussd/ Review of the EU Sustainable development strategy.
13. http://sustainabledevelopment.un.org/index.php?menu=1298 Future We Want – Outcome document.
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19. http://www.minedu.government.bg/opencms/export/sites/mon/left_menu/documents/documentsproject/2012/doc/proekt_NK_2012-2013_izvanuchilishtni.pdf
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