

DIVERSE APPROACHES TO OVERCOME ENERGY SHORTAGE FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

Education for Sustainable Development (ESD) is an alternative model of education that aims to make society more sustainable by balancing economic, socio-cultural and environmental factors through education, or 'learning', and nurturing young people who know themselves and can act in a responsible way for a sustainable future. The aim of education for sustainable development (ESD) is to help people to develop attitudes and skills, and to acquire knowledge that allows them to make decisions based on benefit to themselves and others, now and in the future, and to put these decisions into practice. We must look towards a future in which environmental, social, and economic decisions are in balance, in the quest for development and a good quality of life. The goals and objectives of the ESD are to provide an opportunity for refining and promoting the vision of, and transition to, sustainable development – through all forms of education, public awareness and training; and to give an enhanced profile to the important role of education and learning in sustainable development.

INTRODUCTION

Education and sustainable development are closely linked with each other and should reflect each other in a changing world. Education in this century needs to reflect a balance between economic, environmental and cultural dimensions, and prepare youth not only for the workplace, but how to be active and aware citizens who are able to make decisions, think critically and care for others in their communities. Modern societies may be highly skilled but often sorely lack qualities such as compassion and social responsibility.

Education has an important role to play in developing the whole child from the inside out. The development of the wise, happy and holistic youth who can

make sustainable decisions and take action for a sustainable future. It is essential to balance development among the cultural, environmental and economic dimensions. Practically this means that teachers, parents and community members educate youth in these three content areas equally, and make connections between them both inside and outside the classroom. Learning does not occur only in schools or at school age. People can and should learn in a variety of places from different people – at school, in the home or in the community by teachers, administrators, parents, elders, friends, and monks. Learning is a lifelong process and life skills and experiential learning can happen anywhere, anytime. For this reason, it is time to have closer cooperation and overlap among schools, homes and communities.

It is the need of the hour that young people should be involved to learn, to participate, and then to lead. Teams of youth volunteers should be trained in basic community development concepts, problem identification and analysis, mobilization skills, and leadership skills which they then could use to spearhead activities in schools and communities. The emphasis is to get the young volunteers to “learn to think, to plan, to act, and to lead”.

Sustainability education (ES), Education for Sustainability (EFS), and Education for Sustainable Development (ESD) are interchangeable terms describing the practice of teaching for sustainability. Various approaches to ESD encourage people to understand the complexities of, and synergies between, the issues threatening planetary sustainability and understand and assess their own values and those of the society in which they live in the context of sustainability. ESD seeks to engage people in negotiating a sustainable future, making decisions and acting on them. The various approaches are summed up as:

- Envisioning – being able to imagine a better future. The premise is that if we know where we want to go, we will be better able to work out how to get there.
- Critical thinking and reflection – learning to question our current belief systems and to recognize the assumptions underlying our knowledge,

perspective and opinions. Critical thinking skills help people learn to examine economic, environmental, social and cultural structures in the context of sustainable development.

- 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.
- Participation in decision-making – empowering people.
- foster increased quality of teaching and learning in ESD;
- help countries make progress towards and attain the Millennium Development Goals through ESD efforts;
- provide countries with new opportunities to incorporate ESD into education reform efforts.
- The education for sustainable development (ESD) acts as a convener, catalyst, and communicator working across all sectors of society.

SUSTAINABLE DEVELOPMENT AND EDUCATION

The idea of sustainable starts out from the alarming reports that began to appear during the 1960s, which warned for humans' way of using nature resources. The resources would come to an end because of the future economical growth and increase in population. The term SUSTAINABLE DEVELOPMENT got an international breakthrough in 1987 with the Brundtland Commissions final report. The definition of sustainable development was stated in this report and it is still ubiquitous. "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"

Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues. Both

formal and non-formal education are indispensable to changing people's attitudes so that they have the capacity to assess and address their sustainable development concerns. It is also critical for achieving environmental and ethical awareness, values and attitudes, skills and behavior consistent with sustainable development and for effective public participation in decision making.

Sustainable development is about a global responsibility and solidarity between generations, between women and men and between different cultures and countries. It is about safeguarding and efficient use of existing natural resources. Investment in management of human, social and physiological resources is also crucial parts of sustainable development. Democratic values permeate the society and the citizens feel that they can influence the development, and that they have the will of taking that responsibility for doing so. The principles underlying sustainable can be separated into a social, economic, and ecological dimension. The economic growth is used to be seen as a requirement for development.

No country can achieve a sustainable economic growth if the environment is worsened, if the prosperity is not fairly distributed and if growth of the human resources has not taken place. Therefore the economical dimension means that economical growth shall carry on with: first, respect taken to the environment, second, growth of the people's health and education and third, a fair distribution of prosperity. The social dimension points out the importance resources, power and influence are fairly distributed and that people can feel security and can participate. The social dimension is therefore a requirement for economic growth. The environment dimension means that considerations are taken for the social and economical development. These three dimensions are integrated with each other as they are interdependent and mutually reinforcing. The implication of this is that sustainable development to a large extent is about politics. In 1992 a UN conference, also known as Earth Summit, was held in Rio de Janeiro.

PLAN TO REFORM CURRENT EDUCATION SYSTEM IN CONNECTION WITH ALTERNATIVE ENERGY RESOURCES

We need to have programs such as "education at work place" and options such as Open University. In fact if we have a life-time partnership between producers and students with real world experience, we can hope to train students better equipped to handle these activities. Changes are necessary in the land and water use and allocation policy. A bio-mass strategy must be implemented to raise the bio-mass production by use of funds currently available for wasteland development with a condition to create and sustain bio-mass pools. Entitlement of the bio-mass to the poor from the local and regional bio-mass pools would make it possible to recover the cost of energy services in the form of bio-mass.

EXAMPLES OF SUSTAINABLE DEVELOPMENT

Sustainable development is a term that can be defined in many different ways. However, the most widely recognized definition is found in the Bruntland Report. Titled "Our Common Future," the report defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." From this definition, sustainable development can be reduced to two key concepts: needs and limitations. The needs, of course, being those of the world's poor, the "needy." The limitations are those "imposed by the state of technology and social organization on the environment's ability to meet present and future needs."

Here are few examples of sustainable development that meet both those needs and those limitations.

1. Solar Energy

The best thing about the sun's energy is that it is completely free. Since solar energy is available in limitless supply, this provides a huge advantage to consumers, while also reducing pollution. Replacing non-renewable energy with this type of energy is both environmentally and financially effective.

2. Wind Energy

Wind energy is another readily available source of energy. Harnessing the power of wind energy is as easy as investing in a windmill. The major problem is finding a

suitable location. However, since wind energy can supplement or even replace the cost of grid power, it may be a good investment and remains a great example of sustainable development.

3. Crop Rotation

The online dictionary defines crop rotation as “the successive planting of different crops on the same land to improve soil fertility and help control insects and diseases.” This practice is beneficial in several ways; most notably because it is chemical-free. Crop rotation has been proven to maximize the growth potential of land, while also preventing disease and insects in the soil. Not only can this form of development benefit commercial farmers, but it can also aid those who garden at home.

4. Efficient Water Fixtures

Replacing current construction practices and supporting the installation efficient showerheads, toilets and other water appliances can conserve one of Earth’s most precious resources: water. Examples of efficient fixtures include products from the EPA’s Water Sense program, as well as dual-flush and composting toilets.

5. Green Space

Green spaces include parks and other areas where plants and wildlife are encouraged to thrive. These spaces also offer the public great opportunities to enjoy outdoor recreation, especially in dense, urban areas.

"Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs." The concept of sustainable development can be interpreted in many different ways, but at its core is an approach to development that looks to balance different, and often competing, needs against an awareness of the environmental, social and economic limitations, we face as a society. Living within our environmental limits is one of the central principles of sustainable development. One implication of not doing so is climate change.

But the focus of sustainable development is far broader than just the environment. It's also about ensuring a strong, healthy and growing society. This means meeting the diverse needs of all people in existing and future communities, promoting personal wellbeing, social cohesion and inclusion, and creating equal opportunity. Sustainable development is about finding better ways of doing things, both for the future and the present. We might need to change the way we work and live now, but this doesn't mean our quality of life will be reduced.

MEASURES TO BOOST SUSTAINABLE DEVELOPMENT

The basis of industrialization is energy. We need to identify the energy needs based on "end-use." This is the departure from Western calculations of energy needs. The main departure is we must look at energy in the following areas:

There can be a major leap in rural infrastructure (villages & small towns), economy and livelihoods if 5T of coal-equivalent energy supply is available per family per year. We currently make available only 0.5-1 ton. However, there is capacity to provide this level of energy with 50% from solar and other 50% from materials such as bamboo, small timber chemical intermediates from plants (such as non-edible oils, phenols, starch, ethanol) etc. So far we have been neglecting solar energy. Currently, from the point of end-use, 40% of energy from coal is in the form of steam (or heat). Steam can also be produced at low-cost by solar-thermal systems. A sustainable development approach can bring many benefits in the short to medium term, for example:

Health & Transport - Instead of driving, switching to walking or cycling for short journeys will save you money, improve your health and is often just as quick and convenient.

The way we approach development affects everyone. The impacts of our decisions as a society have very real consequences for people's lives. Poor planning of communities, for example, reduces the quality of life for the people who live in them. Sustainable development provides an approach to making

better decisions on the issues that affect all of our lives. By incorporating health plans into the planning of new communities, for instance, we can ensure that residents have easy access to healthcare and leisure facilities.

SOME MORE EXAMPLES FOR SUSTAINABLE DEVELOPMENT

An excellent example of low-cost, high-performance solar thermal equipment is fabricated at Bhusawal (Maharashtra). The 10 square-meter concentrator has a modular design with regular-size flat glass mirrors, supported by a steel truss to give the overall shape of a parabolic concentrator. The receiver, located at the focus of the concentrator, is an aluminum cage (about the size of a trashcan) with tubes running around it (for transferring heat to the working medium---oil or steam). The entire structure has been designed to withstand very high gusts of winds. The present cost of the system (including the tracking drive) is Rs. 7500 per square meter. The amount of heat delivered by the unit over a period of 8 hours is roughly 1 kg coal-equivalent (about 3500 kcal in the case of high-ash content coal) per square-meter of the concentrator. If the size of the concentrator is increased, engineered wood-bamboo composites can replace the steel frame with a drastic reduction in the cost.

BAMBOO AS A MATERIAL FOR INFRASTRUCTURE

In Andhra Pradesh a large arched-roof community-hall type structure using engineered bamboo elements was built three years ago taking the local conditions as part of the design. In fact this structure, while built as a cyclone resistant structure, turned out to be the optimal design after exhaustive CAD studies. Another example is in the case of village/small-town roads, where bamboo-grid reinforcement of the road base, has enabled the construction of very durable roads.

There are instances in China, where bamboo used for some applications have survived 2000 years. The point is that preservation treatment of bamboo is not a major issue, particularly so with modern techniques. We glorify traditional knowledge only because times tested lessons are the only ones remain for us to glorify from traditions and they deserve to be studied as sources of knowledge.

Using modern knowledge of structural engineering, and the inherently superior properties of bamboo, engineered wood-bamboo composite structural members with innovative joining techniques have been designed which are as strong and durable as reinforced cement columns and beams. Of course, these do need skilled labor. But, then local artisans can be trained in rural areas, leading to rapid increase in livelihood opportunities and the capacity to build excellent rural infrastructure at very low cost.

The science has given us the ability to make otherwise worthless material into valuable products. (e.g. silicon for computer chips, optical cables instead of copper as medium). After all, all mining activity basically involves converting mud or rocks into materials to which we attach greater value. If we can use modern knowledge properly, half of the energy needs of deprived rural areas and small towns can come from solar-thermal energy, while the other half can come from in the form of high-value materials and chemical intermediates from biomass. However, "ADDING VALUE WITHOUT A VALUE SYSTEM IS NOT SOCIALLY OR ECOLOGICALLY DESIRABLE"

OTHER REPLACEBLE/ALTERNATIVE ENERGY RESOURCES

- Starch from various tubers including tapioca (or cassava), sweet potato
- Sugary juices from sweet sorghum, sugarcane and palms
- Various non-edible oils essentially as energy or chemical intermediates from Jatropha
- Valuable non-edible oils with preservative and pesticides value such as neem, Karanj
- Latex including Jatropha
- Acrylic resins from latex yielding dryland species
- Phenols (for making phenolic resins used as adhesives in various industries) including cashew nut shell and Bhilava nut (Bibba).

- Tannin from bark of Harda etc.

The above list does not include items which have very specific uses and therefore difficult to market such as medicinal herbs, and consumer products such as perfumes, essential oils, flowers with hazard of market saturation. A hand out distributed includes tables for Ethanol yields of various crops based on average yields in Brazil, Types of raw materials potentially useful for microbial conversion to fuels, Energy analysis of ethanol production from various crop substrates.

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