Jaffna

Proceedings

Of

Jaffna Science Association

Presidential Address

Popular Talks

Chairpersons' Addresses

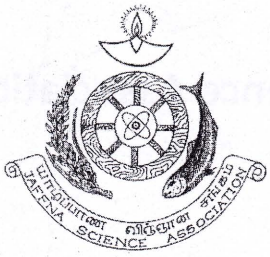
Volume: 20 No. 02

Twentieth Annual Sessions

17 - 19 April 2013

Jaffna, Sri Lanka

ISSN 1800-1300



Proceedings

Of

Jaffna Science Association

Presidential Address

Popular Talks

Chairpersons' Addresses

Volume: 20 No. 02

Twentieth Annual Sessions

17 - 19 April 2013

Jaffna, Sri Lanka

ISSN 1800-1300

Proceedings of Jaffna Science Association

Volume: 20 No. 02

Jaffna Science Association (JSA) is a registered non-governmental organization

Regd.No. Ja/GA/P/CA/28

ISSN 1800-1289

Published on 2nd April, 2014

Printed in Jaffna, Sri Lanka

Printed by: Guru Printers, Thirunelvely, Jaffna.

Editor's Review

The Jaffna Science Association, an NGO, was established in 1991 by the founder President late Prof. A.Thurairajah with the primary objectives such as dissemination of scientific knowledge among the intellectuals in Jaffna region, encouraging national as well as regional research studies and presenting them in the Jaffna society and advancement of scientific knowledge among the secondary school students and at the undergraduate level. With these primary goals, the Association has conducted seventeen annual conferences under the guidance of seventeen executive committees throughout the completed two decades of services.

Every year, specific themes relevant to the region depending on the socio-cultural, socio-economic, and socio-political dimensions dominated the situations were identified and focused. With the guidance of the executive committees several seminars, workshops, popular talks etc. relevant to the themes were conducted. The Annual conferences too focused with themes seminars, popular talks, review lectures and Sectional Chairmen addresses from all four sections However, old other relevant research findings are also accommodated for dissemination of the Association, which are published in the proceedings of the Association.

The present twenty first executive committee has arranged its twenty first Annual Conference during 2 – 5 April 2014 and undertook the responsibility of publishing the presentations held in the twentieth Annual Conference held in April 2013. The abstracts submitted by the contributors have been included in this volume of release.

We have great pleasure in releasing this volume of the proceedings of addresses delivered in the twentieth Annual Sessions of the Jaffna Science Association held April 2013.

A.Rasakumaran
Chief Editor / JSA
02.04.2014

ELTC
University of Jaffna.

Editorial Board

Mr. A. Kugan, Editor/Section A

Dr.(Mrs.) K. Chandrasekar, Editor/Section B

Mr.S.Sathees, Editor/Section C

Mr.A.Rasakumaran, Editor/Section D (Chief Editor)

Content

Value Embedded Education

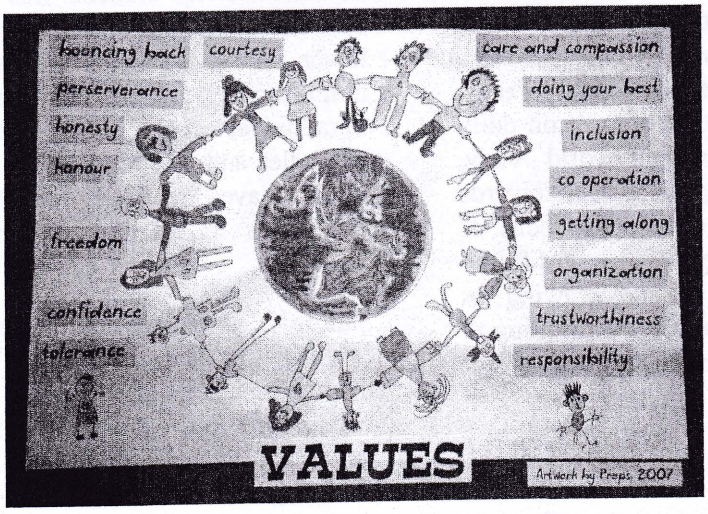
Mrs.Shanmugayogini Ravindran, BA, PGD in ELT, MPhil. in Linguistics

Senior Lecturer Gr. I - English Language, President -Jaffna Science Association

Introduction

Value is something which pervades everything. It determines the meaning of the world as a whole, as well as the meaning of every person, every event, and every action. Even the smallest change introduced into the world by an agent has a value and is undertaken only on the ground and for the sake of some value moments. Everything that exists, and even everything that may exist or in any way belongs to the composition of the worlds, is of such a nature that it not only exists, but also contains within itself either the justification of condemnation of its being. It can be said of everything that it is either good or bad, it can be said whether it must or must not be, or that it ought to or ought not to exist. That its existence is right or wrong (not in the judicial sense) is a broad view of values written by Lossky and Marshal in 1935 and quoted by S.P.Kulshresha (1979).Values are present in all the fields including science and technology. There are philosophical and social view points about values. The philosophers believe that values belong wholly to the inner world of mind. Psychologists say that values are conscious or unconscious motivators and justifiers of the action and judgments. Sociologists state that it is personal as well as social and it is expressed as well as implied. Value is a conception explicit or implicit, distinctive of an individual or characteristic of a group of the desirable which influences the selection from available means and ends of actions "Kluchkhohn (1951).

The Classification of Values



Many scholars have classified 'values' in many ways. Some classifications of values are presented herein. The earliest classification of values was done by J.E.Turner (1929). According to Turner, there are two main values and they are 'abstract' and 'concrete''. In 1951, Dodd classified values into twelve. They are domestic, scholastic, economic, political, religious, philanthropic, hygienic, recreational, artistic, scientific, linguistic and military.

Among the various value classifications the researcher finds that A.P.Kulshrestha's selection of twelve values in his study becomes appropriate, for the present study. S.P.Kulshrestha utilized twelve broad categories of values. They are: Humanitarian, Social, Professional, Progressive, Aesthetic, Economic, Authoritarian, Non-social, Non-professional, Traditional, Non-aesthetic and Extravagant.

Value levels & Development

Hall Tonna when describing about "Values Shift discusses the following aspects. The value levels and development are based on the foundation values obtained in the past. These past values represent our basic needs as the foundation to act upon daily. These need to be strong as we fall back on them during crisis, threat or stress. The present values of a person have an impact on daily lives that describe current world view, criteria for decision making, attitude towards relationships and issues, and the focus of most energy and attention. A vision of future possibility motivating us and drawing us forward towards an ideal, giving meaning to the present are the aspirational values for future vision

Literature related to the study

Various studies have been done on values. There are studies on 'Human Values', and 'Nature of Human Values'. S.P.Kulshrestha, in his "Emerging Value – Pattern of teachers and new trends of education in India", quotes many researchers who have done researches on 'Values'. In his research it is stated that Gillin's study was based on the National, Regional and Cultural values in the United States and recorded the hierarchy of seven values in the following order:

1) Personal output of energy
2) Inner regulated morality
3) Pragmatic genuinity
4) Individualism
5) Change and novelty
6) Recreation, efficiency
7) Love and fair play.

Getzel (1960) found that new values such as sociability, relativistic moral attitude, consideration of others, conformity to the group and a hedonistic present time orientation replace traditional values of Puritan morality, work success, ethic individualism, achievement – orientations and future time orientations. A study on the values of college students was also done by Spindler (1955). The students represented lower, middle, upper class American families and Spindler found a major shift in "Traditional" to "Emergent" values. "Spindler and Riesman (1958), and Whyle (1959) have theorized that a new value system is being formed in American Society.

Sanford W.Reitman discusses about "Human Values in Education". In his essay he analyses the meaning of the concept value, core value, the values exist position (sic), values are gone, and values are changing.

Inlow, in her "Values in Transition" lists a long; key core values and calls them 'value tenets'. The core values are rationality, individualism, material progress, importance of political institutions, the golden rule, status of authority, chauvinism, evils of communism and independence.

Background

Values Education is known internationally by a number of names, including 'Moral Education', 'Character Education' and 'Ethics Education'. Value embedded education was not taught but learned in daily life –acquired through the value embedded lives of our ancestors and through joint family system. The grandmothers, grand fathers and elderly people related 'pancha thantra' stories 'ithikasa' and 'puranas' to their grand children, kith and kin. In the morning and evening elderly and old people sat together with wise and experienced people and saintly beings and discussed all the matters and made it a point to develop and maintain value s in all walks of life .values were respected and protected by the people even though they rarely had higher educational qualifications. The value embedded education was easily imparted to the lay men through ashrams and later through the temples where religious speeches ('katha kalakshemam')and discussions were held. Through reading religious books and by following the lives of great religious leaders, prophets and messiahs many great men and women by becoming value conscious in thinking, uttering words and in practice led exemplary lives. Reading and relating stories and teachings of saints and 'avathars' and quoting them were natural environments through which our ancestors learnt and obtained imparted their value embedded education to the community.

Value Embedded Education

Education imparted by Rishis / Maharishis

Value education is not new or something extra, it is building upon what already exists. In ancient times the whole educational system was based on values. The Hindu 'Gurukul' education was purely based on values. Students resided in special places called 'ashramas'. They served their teachers and learned their lessons under those teachers. The teachers led an exemplary life and practiced what they preached, and thus let the students along the right path. They transmitted values such as truth, righteousness, peace and non-violence to their students. Students were trained to do charity, respect elders and teachers. They had to get rid of anger, envy, competition, jealously and selfishness, while learning together. Each student was given individual attention. Even a young prince had to go with the other students to collect firewood, wash his teacher's clothes and thus all were given chances to develop equal mindedness. Apart from the life style, the texts too stressed human values. The students were able to distinguish what are mean and what are high values. The ancient scripts and literature described the characteristics of each caste and profession. Thus the students lived, experienced and practiced all what they learned daily for twelve years, without contact with their parents. Before taking to a profession they were taught what values are involved and each student chose his profession for which they had a higher place of value. The religious and secular literature clearly stated what is wrong and what is right. Which is good and which is bad. What can be done to avoid or overcome evil? What should be one's ultimate goal? What should a married man or woman do to lead a peaceful life? How should a Minister govern a land? How should one accumulate wealth and how should one spend it. What values

should one possess and what values lead one's downfall. The students learned that a person who has all types of bad qualities like anger, hatred, selfishness, greed, cheating, crime, fraud and lying finally losses everything and gets defeated by the person who has good values. Moral along with spiritual education was given emphasis. The pupils were molded and shaped to fit the type of society they were going to face and the type of profession they were going to follow. The ultimate goal was to finally find the supreme truth.

Under Buddhist education, students learned together as a group. Buddhist education stressed on bodily health and aesthetic values. The body is to be decently draped, cleaned and massaged. Regularly fed, sheltered in the rainy season, rested during the noon day heat and medically treated when ailing by the best physician" Mukergee (1963). Buddhists give great significance to the value of non-violence.
Later Sikhs, 'Jains' and Muslim schools flourished in India. Rulers like Akbar, changed the system of education. Now the trends are different. Along with new scientific discoveries, people have given up the search for significant of human values. The values look old fashioned and outdated to the teachers and students.

Values can be personalised, politicised and contested. Values education can strengthen students' self esteem, optimism and help students to exercise ethical judgement and social responsibility. What is new is progress towards a conscious, explicit and planned approach to values education for all students in all schools.

Education today

Education is a powerful social force. It transmits and shapes culture and beliefs. It can reveal and develop the potentialities inherent in each individual. It can prepare individuals to contribute to the well-being of themselves, their families, their communities, and to humankind as a whole. Non existence of 'Gurukula sampradaya' as well as joint family system has adversely affected the present education. Dealing only with external world around us and not related to the inner self of an individual. Misdirected educational system- instead of developing a person as a human being it is only directed towards superficial surface level achievements designed purely for money making and not for man making scenario. The present education system provides more opportunities to obtain jobs. But for obtaining education and jobs man becomes very selfish and lacks sincerity and integrity as he faces competition. As a consequence he suffers from tension and stress which leads to various illness and disease, misbehavior, crimes and illegal activities. The lack of value embedded education and ignoring the values which have been preserved by our ancestors is the cause for the loss of peace in mind and in the country. Following are some of the examples of shooting incidents which took place in schools and other places.

Shooting incidents in Schools last 10 years
Thursday, October 11, 2007

More than 60 shooting incidents have occurred at the nation's schools during the last 10 years, according to data compiled by National School Safety and Security Services Inc., a Cleveland-based consulting firm. Here are some high-profile incidents:

- Nickel Mines, Pa., Oct. 2, 2006. A milk-truck driver entered a one-room Amish schoolhouse with a semiautomatic handgun, two rifles

and hundreds of rounds of ammunition. He killed five girls and seriously wounded six others before killing himself.

- Essex, Vt., Aug. 24, 2006. A gunman killed two people and wounded three others during a rampage through two homes and an elementary school before wounding himself.
- Red Lake Indian Reservation, Minn., March 21, 2005. A high school student went on a rampage, killing nine people and wounding seven others before killing himself.
- Littleton, Colo., April 20, 1999. Columbine High School students Eric Harris, 18, and Dylan Klebold, 17, killed 12 students and a teacher and wounded 23 before they committed suicide.
- Springfield, Ore., May 21, 1998. A 17-year-old boy opened fire at a high school, killing two people and injuring more than 20 others.
- Jonesboro, Ark., March 24, 1998. Two boys, ages 11 and 13, opened fire on their middle school from nearby woods, killing four girls and a teacher and wounding 10 others.
- **Tragedy at the Elementary School:** Tragedy struck in a place in Newtown, Conn where parents thought their children were safe. At least 27 people died. 20 children, 7 adults including the principal were shot dead. And the gunman killed himself.

Victims of Conn. school shooting

The present shooting incidents in schools, Murders and other crimes show that humans are the most violent animals on the planet, and we probably are.

Educators

Educators have a powerful influence on people's attitudes and perceptions, and that influence is magnified in the case of children. Educators can identify, provide and encourage examples of high ideals and achievements worthy of human endeavor, and highlight conditions of injustice with the aim of educating humanity toward their rectification.

Values Education: Setting the Context

"We live in difficult times when peace and human security are facing new challenges at the individual and global level. Education is a key dimension of the long term process of building peace, tolerance, justice and intercultural understanding- the reorientation of education to create a better world is truly urgent."Koichiro Matsuura Director-General of UNESCO

Values Education

Values education is a challenging and complex domain as it has long been neglected by the educators. It has now become a crucial issue in incorporating value education to suit all the races and religions. Designing curriculum to suit all the students and deciding the content of values education, curriculum educators have to think what pedagogies can be used to teach values and whose values should be incorporated and which values should be given priority. The educators also have to design explicit and/or implicit school based activity which promotes student understanding and knowledge of values, and which develops the skills and dispositions of students so they can enact particular values as individuals and as members of the wider community.

Approaches to Values Education

Providing a place in the curriculum for specifically studying values– their nature and significance in our life-choices, and how one goes about justifying them and negotiating value agreements in the group: in short, studying the "discipline" of values discourse.

Values Education Programs:

Drug Education, Religious Education and various other programs such as Social Skills Programs, besides the training of intellect, include the refinement of heart and the discipline of the sprit. It brings out all that is unique in individual by helping him to establish the right practice of ethics in the field of education. Stake holders will be able to see schools as value training grounds.

Knowing Rather Being Knowledgeable

Emphasis will shift on knowing rather being knowledgeable. It will cater the formation of qualities to help students become decent human beings. Students will be able to read more than mere words. Students will enhance the art of written expression by expressing what is in their mind and heart so as to teach, persuade or move the person who reads their words to think and reflect about life and their part in it.

Significance of values in profession

Students will emerge:

i) as tolerant and humble professionals

ii) honest and dedicated workers

iii) owners of the community

iv) hard strivers to make world a better place

Significance of values in Social Field

A student will be able to:

i) emerge as a truth seeker

ii) develop good listening skills to the other's point of view

iii)communicate well and

iv)emerge as more ethical leaders for the society

New awakening

Education is intrinsically and by definition value-oriented during the last 200 years and more, certain factors that have retarded the right upward impulses of culture and education. This has happened all over the world, and everywhere there is a new awakening today to infuse value-oriented both in culture and in education.

Current education trends

To focus on the many examples of conflict, to undermine faith in human capacity to change, and to reinforce values and patterns of behavior that lead to disunity, injustice, violence: in short, values and patterns which lead to violations of human rights and instability in society.

Value Levels & Development

Foundation Values - Past

Values acquired from the past represent our basic needs as the foundation to act upon daily. These need to be strong as we fall back on them during crisis, threat or stress.

Focus Values - Present

Values priorities in daily lives that describe current world view, criteria for decision making, attitude towards relationships and issues, and the focus of most energy and attention.

Aspirational Values – Future Vision

A vision of future possibility motivating us and drawing us forward towards an ideal, giving meaning to the present.

Values & Skill Development

To act upon aspirational values one requires awareness, relevant knowledge, understanding, commitment, courage, appropriate skills, learning, brain thinking & learning.

World Views

- Values don't exist in a vacuum – they come out of the beliefs we hold about the world
- We need to understand why people hold different values and why they behave differently
- The overall perspective from which one sees and interprets the world
- A collection of beliefs about life or the universe held by an individual or a group

It is the root, the source, from which our thoughts, values, actions and feelings spring. Educators have characterized 'taking action' as moving from cognitive understandings of values towards manifesting values in personal and pro-social behaviours. Students live and practise the values rather than simply knowing about them.

Conclusion

What emerges from the foregoing is that the value embedded education should emphasise the relationship between Science and Value. In our presentation of values, we do not need to be prescriptive; we should encourage methods of explorations. As we explore deeper and deeper, we shall find that there are values which are relative and subjective; but we shall also find that there is in us a dimension of Value and that this is an undeniable objective fact. There is also the fact that the more one advances in the theory and practice of Value, the more is one obliged to overcome selfishness, egoism and subjectivity, and the more is one led to the discovery of the Categorical Imperative, the criterion of which is translatable in some

kind of objectivity and universality as shown by the Bhagavad-Gita in its concept of *lokasangraha*. What we call good actions can be relative, and our judgement about them can be subjective; but there can be no denial that, objectively speaking, the highest goodwill for the highest good of all is the highest conceivable Value.

Recommendations

1. When schools focus consistently on values in the school, and particularly through curriculum, parents and the broader community can work in partnership to create congruence between the values espoused at home and those espoused at school.
2. Values education is not merely a program that can be implemented in classrooms; it is a process that involves teachers in ongoing professional learning and action research in a 'plan, do, study, act' model that actively nurtures 'the teacher as researcher' and ultimately transforms practice.
3. With sustained implementation over time, values education approaches lead to improved student social skills and to safe and harmonious classrooms and playgrounds.
4. With a metalanguage to discuss values, and more importantly to understand and include them in their daily lives, students develop their communicative competence and improve their literacy performance.
5. Students participating in values approaches are more engaged in learning and show improved education outcomes when learning is linked to their lived experiences.

Values bring quality and meaning to life. Values give a person his identity and character.

Values act as guidelines and they tell us what we should and should not do. They make us realize that what we are is more important than what we have. Values protect the beings and allow them to exist without disturbance.

Values education must be seen as relevant and important to all and needs to be in context to the people and the environment they are living in. The development of values education needs to be localised and contextualised in order for each student to best internalise them. .

References

1. Dodd, *C.H.* (1951) The Centenary Lectures, Clwyd.
2. Getzels J .W. (1957) "Changing Values Challenge the Schools." School Re 6 Spring 1957.
3. John Gillin (1995): National and Regional Cultural Values in the United States University of North Carolina. Oxford University Press.
4. Kluckhohn,F. (1962): "Values in Different Society in Culture and Behaviour, Free Press, N.Y.:On Classifying Human Values, a step in predicting of Human Valuing".
5. Kulshrestha, S.P (1979): Emerging Value Pattern of Teachers and New Trends of Education in India.
6. Lossky N. O. and John S. Marshall. **(1935)** ***Value and Existence***. London: George Allen& Unwin, Ltd. 1935. Pp.223.
7. Reitman, Sanford W., (1971). "Teacher Role Strain: A Neglected Problem."The Journal of Teacher Education, Vol.22, No. 2, Summer 1971, 215-218.
8. Riesman, David and Joseph Gusfield. (1970). Academic Values and Mass Education; the Early Years of Oakland and Monteith.
11. Spindler. G. D, (1955) "Education in a Transforming American Culture."Harvard Educational Review 251 1450156; spring 1955.
12. Turner, J.E (1930). Contemporary American Philosophy. Two Vols. (New York: The Macmillan Co. London: George Allen and Unwin Ltd. 1930. Pp. Vol. I, 450; Vol. II, 447. 16s. Net Each.
13. Whyle,H.,et al., (1961) 'Reduced-time Facsimile transmission by digital coding" . IRE Transaction on communication Systems, CS-9, No 3, September 1961, p.125.

BENEFITS AND PROBLEMS OF EXERCISE

Prof. K. Sivapalan,
Associate Professor,
Department of Physiology

Abstract

Development of technology has made muscles and bones redundant. Association between lack of exercise and non-communicable diseases led to studies on exercise. Benefits of exercise include: increased strength and vascularity of skeletal muscles, increased strength of bones, tendons and ligaments, thicker articular cartilage, increased growth at epiphyseal plate, reduced risk of heart diseases, reduced coagulability of blood, improved blood glucose control, improved lipid profile (less LDL and more HDL), improved Immunity and wound healing and reduced adipose tissue. Benefits to higher functions include improved problem solving ability, feeling of wellbeing, good sleep, reduced anxiety and depression and reduced sexual activity among adolescents. Exercise plays an important role in rehabilitation after many disorders. The negative aspects of exercise include injuries – overuse, accidental or foul play. Whether the stresses of competitive sports outweigh the benefits of exercise is worth considering. Effects of exercise in illnesses like viral infections, liver diseases and kidney diseases seem not to have been studied adequately. Majority of the world population is undernourished and still depends on manual work to earn their living. The effect of excessive energy expenditure of exercise on their body composition and health is likely to have adverse consequences. Whether females get all the benefits as males remains as a question and the problems of exercise during menstruation and pregnancy need consideration. Exercise induced asthma is known. The problem of increased dust due to hyper ventilation of exercise in dusty environment could be another risk of respiratory infection.

1. **Introduction**

Human is said to have evolved as hunter-gatherer. Until about 200 years ago, human beings depended on the muscles and bones to get food or to protect from enemies. The body evolved to suit the needs at that time with roughly 40 % of the body mass as muscles and 10 % bones. Large portion of the brain and spinal cord are dedicated to control of muscles. The cerebral cortex (intellectual brain) has evolved in human which makes human unique and capable of controlling the behavior considering the long term benefits and consequences. But the limbic system, that is the emotional brain, continues to dominate the control of behavior as in other animals based on the immediate needs and comfort. The commands of the intellectual brain are mostly ignored. The development of technology facilitating automation and communication has made physical activity redundant and the people are using the muscles, bones and the brain minimally. But the nature of the body and the brain remains the same as before, obeying the principle, "use it or lose it". This necessitates compulsory indulgence in physical exercise to remain healthy if the life style is sedentary. The aim of this lecture is to explain the role of exercise in healthy life and to illustrate the problems associated with it on the basis of the scientific publications.

2. **Exercise**

Exercise is muscular activity. It may be related to fulfilling the needs of the day-to-day life or planned physical exertion either in play ground or in gymnasiums. Mild exertion is the exercise done without much strain to the body and without considerable change in heart rate. On the other hand, heavy exercise is done using maximal muscular power, stressing the body. Moderate exercise is done with medium intensity between the two extremes.

3. **Nutrition**

Food is used for growth and to provide the energy for body activities. The following equation is important with respect to energy intake:

Energy-Intake = Energy-for-Exercise + Other-Energy-Needs-of-the-Body ± Body-Energy-Storage

Energy intake is the energy liberated by combustion of the carbohydrate, fat and protein in our diet. Energy for the exercise is the amount of energy needed for the working muscles and the additional need for the extra activity of the heart and others during the exercise. When we relax without any external work, there are internal works going on such as the heart, respiratory system, the digestive system and other systems. Body energy store is the energy equivalent to the energy that will be liberated when the combustible substances such as body fat and the proteins are combusted. Therefore, if does excessive exercise and does not match it with increased food intake, weight loss is inevitable. Similarly, over eating without exertion will result in increased body weight.

Inadequate energy intake can result in reduced muscle mass, reduced bone density, increased risk of fatigue, injuries and illness and disturbance in reproductive function. Whether exercise should be performed on empty stomach or after meals is a controversy but for

glucose control, exercise after meal is said to be beneficial. Vitamins B, C, D, E and beta carotene and minerals like calcium, iron, zinc, magnesium and selenium should be provided adequately to meet the increased body needs of exercise. These deficiencies can become a problem in people doing exercise for weight reduction with dietary restriction. Dehydration and hyponatremia leading to muscle cramps and renal and circulatory problems can occur if adequate fluids and electrolytes are not consumed to match sweating (American Dietetic Association (ADA), Dietitians of Canada (DC), and American College of Sports Medicine (ACSM), 2004).

4. **Metabolism**

It has been observed that metabolic functions of those who engage in regular physical exercise adapt towards better health. Exercise training increases the enzymes to utilize more fat for energy than glucose. Exercise training increases oxidative capacity and minimizes glycogen depletion (Cartee, 1994).

The fact that the hormone insulin is a major controlling factor of metabolism and its deficiency causes diabetes mellitus is well known. In regular exercisers insulin sensitivity is increased and the level of leptin, which causes adverse effects in the body, falls (Ramazan Sari, 2007). When energy intake exceeded energy expenditure, serum cholesterol and phospholipids levels were increased. Therefore energy deficiency nullifies the benefits of exercise (Vaisberg M, 2012).

Short and intense exercise like sprinting is said to increase post exercise metabolism to facilitate weight reduction (Hazell TJ, 2012). Change in intramyocellular lipid content was not clear and said to be dependent on metabolic status (Bajpeyi S, 2012).

5. **Exercise and Diabetes**

Now let us look at the exercise as a therapy for diabetes. Regular exercise reduces the risk of diabetes in overweight and obese individuals (Chae JS, 2012). Regular walking exercise was associated with increased energy consumption, decreased fasting blood glucose, haemoglobin A1c and reduced trigleceride level. The study claims that walking can reduce the complications of type II diabetes. (Sung K, 2012). The response was better when the walking was after dinner. Moderate exercise increases glucose up take by muscles more than that of hepatic glucose release reducing the blood glucose level. At the same time insulin level also falls making the risk of exercise induced hypoglycaemia low. This can be a problem for people on insulin injection or drugs that stimulate insulin secretion.

6. **Skeletal Muscles**

One effect of exercise training on skeletal muscle is hypertrophy (Ogasawara R, 2012). The number of arteries in the muscle was increased in young rats and cross sectional area of the vessels increased in old rats (Behnke BJ, 2012). The expression of the gene for heat shock proteins is activated by exercise (Morton JP, 2009). This protein is said to be involved in homeostasis of the muscle, facilitation of repair after injury and preserving muscle function through aging. Exercise also is said to promote anabolic effect on

protein in preventing muscle wasting of old age.

7. **Bones, Tendons and Ligaments**
An experiment in young mice has indicated that physical activity is proportional to the volume of the articular cartilage (Plochocki JH, 2006). An exercise program in older women did not show any change in articular cartilage. But postmortem examination of horses revealed increase in hyaline cartilage, calcified cartilage and subchondral bone thickness in relation to exercise (Tranquille CA, 2009). Exercise may influence the articular cartilage in young children (Brama PA, 2009). The joint form is modified during post natal ontogeny through differential rates of articular cartilage proliferation which is probably regulated by the magnitude and orientation of stress in the articular surface. Bone mass and architecture are influenced by load bearing (Lanyon, 1996). The functional strain on the bone leads to adaptive response of the bone which results in remodeling along the line of stress (P., 2009). A fibroblast growth factor is secreted in response to exercise and investigators are looking at its effect on reducing blood glucose. Whether it contributes to strengthening the tendons and ligaments is worth considering. One survey investigating knee abnormalities reported more abnormalities among more physically active persons (Stehling C, 2010). Running as a course of osteoarthritis is inconclusive and may depend on pre-existing health of the joint (Hansen P, 2012).

8. **Injuries**
Epiphysis is stimulated by weight bearing of exercise in addition to endocrine factors. Excessive weight bearing can cause damage to epiphysis and stunting. Muscles and bones are subject to injuries due to excessive training for competitive sports or games. Accidental injuries and willfully inflicted injuries are also risks of competitive sporting. The stress of competitive sporting can overweigh the benefits of exercise by the catabolic actions of stress hormones. The harm of exercising with viral infections, liver diseases and kidney disease needs consideration.

9. **Immunity**
Exercise immunity is a growing field. Antibody production is supposed to be optimal in moderate exercise but intense exercise is reported to suppress it. This is transient suppression and passes off within 24 hours but repeated or continuous intense exercise may result in chronic suppression of acquired immunity. The suppression may be due to elevated stress hormones and alterations in the balance between pro and anti-inflammatory cytokines. Exercise alters the number and function of neutrophils, monocytes and natural killer cells. This may be due to the anti-inflammatory effect of exercise. This anti-inflammatory effect is also reported to be profilactic in insulin resistance, atherosclerosis, tumour growth and neuro-degeneration. Enhanced anti-tumour immunity is reported to protect against post menopausal breast cancer and cancers of colon,

endometrium, lungs and pancreas. Progression of HIV infection to AIDS is reported to be slowed down by moderate physical activity.

10. **Respiratory System**
Exercise training improves pulmonary function at rest and during exercise by enabling greater operating lung volumes. There is a concern about increased incidence of respiratory tract infection among athletes and investigators relate this to immuno-suppression of exercise. The effect of inadequate air conditioning in the upper respiratory tract resulting cooler air and increased dust load due to hyperventilation of exercise and breathing through mouth is worth considering. The cool air is attributed to exercise induced asthma. Significant benefits from exercise training are reported in chronic obstructive pulmonary diseases, acute exacerbation of chronic obstructive pulmonary diseases and co-morbidities.

11. **Blood**
Thrombotic risk increases with aging through increase in fibrinogen, factor VII and plasma viscosity. Regular exercise reduces this risk. Acute exercise which is unaccustomed strenuous exertion is reported to cause transient activation of the coagulation system accompanied by increase in fibrinolytic capacity. This may be a reason for ischeamic heart problems being precipitated by sudden exertion. Other contributory factors may be haemoconcentration due to reduced plasma volume and rupture of small, inflamed coronary plaque and resultant activation of thrombogenic factors. Long term moderate or strenuous physical activity is associated with considerable reduction of cardiovascular morbidity and mortality.

12. **Cardiovascular system**
Beneficial effects of exercise training on resting heart rate, heart rate recovery, exercise heart rate and exercise blood pressure showed strong association in runners and swimmers, less in walkers and least in sedentary persons. Exercise is reported to result in larger end diastolic volume and wall thickness, more in males but others doubt it saying that the increase does not exceeded the limit of resolution of the methods employed even though statistically significant. Training also showed increased transport capacity by increase in blood flow and capillary exchange. The Structural change included increase in cross-sectional area and angiogenesis. Functional change was improved control of vascular resistance. Other adaptations observed were improvements in endothelial function, vascular smooth muscle function, antioxident systems and heat shock proteins and reduced inflammation. While strenuous exercise increases oxidative metabolism and produces a pro-oxidant environment, regular moderate physical activity promotes an antioxidant state and preserves endothelial function.

13. **Cardiovascular Rehabilitation**
A bout of afternoon exercise interrupted with short rest periods is recommended for lowering

blood pressure. Patients who underwent Coronary Bypass syrgery improved exercise capacity associated with restorations of peripheral oxygen utilization in both with and without Diabetes after exercise training. Aquatic exercise improved exercise capacity and muscle function in patients with the combination of Congestive Cardiac Failure and Diabetes. Exercise failed to show any beneficial effect on Intermittent Claudication in one study. Exercise training is also reported as effective antioxidant and antiatherogenic therapy. However, numbers of adverse events were observed in one study: 12.2% for Systolic Blood Pressure, 10.4% for Tri Glecerides, and 13.3% for High Density Lipoprotein-C. About 7% of participants experienced adverse responses in two or more risk factors.

14. **Higher functions of the Brain**
In an experiment with rats, exercise reversed the effects of early maternal separation partially which suggests the effects of exercise in coping with early life stress. Exercise reduced depression and fear of falling in older persons. In another study, exercise training resulted in significant improvements in depressive symptoms, fatigue and vigor, and aspects of quality of life. Exercise with integrated cognitive and motor coordination may help with preservation of global ability in elders at risk of cognitive decline as observed in Chinese old subjects. Other suggested benefits include improved problem solving ability and feeling of wellbeing.

15. **Sleep**
Exercise, 5-6 hours before sleep time, has been recommended for enhancing sleep. In animals exercise increases NREM sleep. Six months of training improved sleep in elderly. Exercise training program has moderately positive effects on sleep quality in middle-aged and older adults. Moderate treatment efficacy is reported for the reduction of apnea-hypopnea index in sedentary overweight and obese adults. Exercise may be beneficial for the management of obstructive sleep apnoea. In Stage IV lung and colorectal cancer patients exercise seemed to improve the mobility, fatigue, and sleep quality. Physical exercise could be an alternative or complementary approach to existing therapies for sleep problems.

16. **Reproductive System**
Physical Working Capacity at heart rate of 170 was found to be decreased in luteal and menstrual phases. Strenuous exercise is associated with delayed puberty, luteal phase deficiency, oligo-amenorrhea or anovulation. This could be due to disturbance of GnRH pulsatility. It is postulated that energy expenditure exceeding energy intake as the main cause. Leptin also may have a role in it. Hypoestrogenemia found in athletic females can cause premature osteoporosis but most cases are reversible with dietary and exercise modifications. Exercise is suggested for patients with pre-eclampsia because it is observed to result in improved blood flow, reduced blood pressure, enhanced placental growth and vascularity, increased activity of antioxidant enzymes, reduced oxidative stress and

restored vascular endothelial dysfunction. Menopausal symptoms such as night sweats, mood swings, and irritability were reduced by aerobic training. High impact sports activities may produce urinary incontinence. Effect of exercise on male reproductive system is not considered.

17. **Sexuality**

Examination of diary entries revealed greater sexuality enhancements such as frequency of various intimate activities, reliability of adequate functioning during sex, percentage of satisfying orgasms, etc. among exercisers. Reduced or abstinence of sexual activity was reported following cardiac events. The suggested reasons were fear of coital death, re-infarction, dyspnea, anxiety, angina, exhaustion, depression, loss of libido, impotence, partners anxiety or concern, and feeling of guilt. It is reported that patients that can climb one or two flights of stairs can keep his/her marital sexual life without running further risk or even experiencing cardiac symptoms. Among normal individuals, risk of Myocardial Infarction during sexual activity is three times higher. The sexual activity could be viewed as acute exercise and the risk can be reduced and sexual function can be improved by regular exercise. Erectile dysfunction in middle-aged men is often improved by physical activity. Adolescents indulge in sexual activities due to lack of recreation- exercise.

18. **Rehabilitation- Cancer**

In patients with prostate cancer exercise is reported to provide positive benefits for improving surgical outcomes, reducing symptom experience, managing side effects of radiation and chemotherapy, improving psychological health, maintaining physical function, and reducing fat gain and loss of muscle and bone. In breast and colorectal cancers survivorship was increase by 50%-60%. In the wide range of cancer populations, both young and old, with curative and palliative intent, exercise is well tolerated and benefits the patient psychologically and physically.

19. **Rehabilitation- Old Age**

The proportion of the aged population is increasing and minor illness will render them dependent. Exercise training was feasible and effective in reducing fear of falling and improving dynamic balance and isometric strength in institutionalized older people with fear of falling. Older women can effectively change the decline in physical ability associated with aging by exercising. The 60-65 year age group was the most capable of converting physical activity into health benefits in both the short and long term.

20. **Conclusion**

There is much evidence that a moderate amount of exercise is needed for the maintenance of functional integrity of all body systems. Not only can exercise reverse the effects of immobilization, it can readily produce a further 10 to 20% improvement in strength and aerobic power, effectively postponing functionally important thresholds for some 10 to 20 years. Regular exercise is rapidly gaining widespread advocacy as a preventative measure in schools, medical circles and in the popular

EMPOWERMENT TOWARDS SUSTAINABLE DEVELOPMENT

Dr. T. Velnampy
Professor, Dean-Faculty of Management Studies & Commerce
University of Jaffna, Sri Lanka.
Email:tvnampy@yahoo.co.in

Introduction

We are living in a competitive world. Each individual, in the society has to strive to achieve his/her target by competing with others. Nowadays, due to the rapid changes organizations are trying to overtake their competitors. Organizations must consider many factors which determine empowerment in order to achieve their goals. Organizations pay a special attention on human resources which are considered as an organization's real assets to sustain in the market. So that, scholars and experts consider employee empowerment in human resource management as an interesting area (Moye Melinda and Henkin Alan, 2006). Employees are talented, motivated and have a lot of talent powers, and using these potential regarding empowerment, it will lead to organization's growth and development.

Empowerment is a term of institutional arrangements in which the autonomy, freedom of action and responsibility for the decision, delegate to employees based on it. Some researchers consider empowerment through participative management as involving employees in decision making and maximizing their job's involvement in the organization (Geisler, David, 2005). The empowerment is a continuous and permanent process and analyzed in a dynamic environment at different levels. Empowerment implies on motivational or psychological issues, structural changes, the cultural and historical elements, and institutional content values consist of: system, methods, and measures that used to develop productivity improvement and growth of organization. Employees require authorities' adequate training, financial credit, and enough information to be accountable in their decision in empowerment process (Geisler, David, 2005).

Indeed, the real and sustainable competitive advantage of the organizations is possible through its employees. So that we should push individuals to actively involve with the tasks. Hence, the concept of empowerment is closely related to use of human resources to achieve organizational goals effectively. In a way, employee empowerment acts as a human resource management strategy to create productivity and provide greater satisfaction for staff in autonomy, choices, responsibility and participating in decision making. Accordingly we can strengthen individuals in the organization (Yazdanpanah, Ahmad Ali, 2005).

There is a great deal of literature dealing with the measurement of the concept of empowerment. Empowerment is generally defined in relation to its application within a specific context. Empowerment crosses

psychological, gender, labour, and economic fields. There are also international views of empowerment, concerning the relationship between individuals and between individuals and society. Thus, several studies have been conducted on empowerment and they identified a number of factors (Saber Ghorbani, Roghayye Alilov & Leyla Noubari, 2012; Motieei Langroodi, Ghadiri Maesoum, Davar Khani, Yadollahi Farsi, & Torkashvand, 2012; Sathiabama, 2010; Ifenkwe, 2012; Hedayat Allah Nikkah and Marof Bin Redzuan, 2010; and Matthew Borode, 2011). Accordingly, the following are listed as the factors determining empowerment.

i. Clear Goals
ii. Providing information
iii. Training
iv. Delegating authority
v. Trust making
vi. Participative management
vii. Capacity and competence
viii. Education
ix. Organization factor
x. Financial and economic factor
xi. Autonomy and freedom
xii. Experience
xiii. Creativity
xiv. Social and emotional support
xv. Challenging
xvi. Leadership style
xvii. Responsibilities and accountability
xviii. Self – reliance

In addition to the above factors following are considered as some personal and social capabilities which are developed as result of taking up enterprise among rural women.

i. Economic empowerment
ii. Improved standard of living
iii. Self confidence
iv. Enhance awareness
v. Sense of achievement
vi. Increase social interaction
vii. Engaged in political activities
viii. Increased participation level in meeting at community
ix. Improvement in leadership qualities
x. Involvement in solving problems related to women and community
xi. Decision making capacity in family and community

We can empower people by considering all these factors. Anyhow the extent of influence of these factors may vary people to people, time to time, and situation to situation. Studies suggest that empowerment is influenced by different set of measures. However, all these explanations demonstrate that empowerment is a variable that leads actor ie: individuals, organizations and communities. Hence this paper tries to describe the empowerment at all three levels which lead to the sustainable development of the people, organizations and community/nation.

Empowering Individuals

Human is the most important resource better than the physical resources, because all physical resources are handled by human resources. So that empowering individual is considered as a most important component in human resource management. Empowering individual is actually started from the childhood of a person at the family level. People can also

be empowered through the organizational setup.

We all have to think, how individual can be empowered at the family level. The following recommendations are given to empower individual at family level.

Family is the basic unit in the society. So that, we must create a good family environment which is the base for physically and mentally healthy child. If the family environment of a person is good and peaceful during the person's childhood in particular, the thoughts that build up in him/her too are good, peaceful and wholesome. We should ignore an unpleasant situation in the family. Family is the place where a child gets basic needs and important qualities. Therefore it is important to ensure that a child gains the following from family:

i. Love and affection
ii. Protection
iii. Kindness
iv. Education
v. Good behavior
vi. Good manners
vii. Knowledge from past generations
viii. Knowledge about tradition
ix. Food and nourishment
x. Learning to respect others' ideas
xi. Learning to respect leadership
xii. Learning to exercise leadership qualities
xiii. Spending leisure in a meaningful way
xiv. Learning to live in society in a virtuous way

If a child fails to gain many of the above from the family, he/she will become naughty and un useful fellow to family and society. Further, he or she may face difficulties to cope up with others in the schools or higher educational institution, work place and even in the society.

Hence, it is very clear that making a child as good citizens in the society is purely attributed to the family.

In addition to the family, individual can be empowered in the following ways:

We have to consider the stages of human development for the empowerment here, it is better to see the age groups of a person. Healthy human population has five identifiable age groups such as infancy, adolescence, adulthood, middle age and old age with varying level of cognitive development (Ifenkwe, 2012).

Generally, family highly influences to the empowerment of a person up to the age group of adolescence and adulthood which can be termed as youths (Nwachukwa, 1994). Youths is the relative term defined by a given age range and with its meaning varying across cultures, groups and countries. The Food and Agriculture Organization (FAO) of the United Nations defined youths as young men and women between the ages of 15 and 24 years. Some Non Governmental Organization (NGOs) defined youth as men and women between the ages of 15 and 30 years.

Youths have conflicting personality, motivational and developmental characteristics. The period witness rapid physiological changes that usher in puberty and adolescence. It is a period of character building and a time of handover of human patrimony or matrimony (Ngwoke, 1992). It is the age of hope, of

promise, of enthusiasm, of plans and of ideals (Okogie, 1992). Other tantalizing qualities of this stage of life include belief in a better world, condition of being fresh and vigorous, being daring, inquisitive, enterprising, and full of energy.

It is also a period when a number of anti-social and disruptive behaviours manifest. These include reckless spending, drugs and alcohol addiction, sexual immorality, extremism, cultism, restiveness and other forms of juvenile delinquency. Adedoyin (2005) summarized characteristics of youths as including innovation proneness, minimal risk aversion, faster reaction time, less fear of failure, less conservatism and greater physical strength. Others are greater knowledge acquisition propensity, social propensity and faster rate of learning and faster relation building.

Therefore, we need to appropriately handle the conflicting personality, motivational and developmental factors associated with youth and the transition from youth to adulthood. Hence, the youths can be empowered in the following ways:

1. Educating youths

Organizing educational program will empower the youth to achieve self fulfilment through the education. Knowledge of youth can be enhanced and skills can be developed which will make a positive changes on the attitudes towards success. Gaining knowledge, developing skill and mastering challenging tasks generally develop the confident of a person through competency.

These competency and confident help them to create an enabling environment for their participation in rural, community and nation development.

Educational system of the country should pay the way for mastering the people in the field where they like, interest and indulge. Even though educational standard of Sri Lanka is in the increasing trend, there is a lack for the vocational education. Creating opportunities for vocational and technical education will empower the people who specially drop out the studies with secondary education. Further, we can educate them how to continue their higher studies in an alternative way.

2. The Matching Expectations with Capacity

People should learn how to form positive expectations for their capabilities. However the expectation should be equal to the capacity of the people. Expectation over the capacity is unrealistic and non achievable. Hence, we try to have our expectations matching to the capacities. If we feel, our expectations are over the capacities, first we should initiate actions to develop the capacity. Everyone has strength and weakness. We should be able to recognize our weakness which can lead us to addressing them. Addressing weakness might take the form of actively attacking them to improve our capabilities.

3. Developing Competency and Confidence

Practicing newly developing skills and mastering challenging task generally develop our confident. Knowledge and experience can be the source of confident. Competency allows a person to become more confident which provides emotional

support for an effort to learn new skills and knowledge.

4. **Show the Trust that You have in People**

It will help them to do the right think. It can make intrapersonal and interpersonal effects and influence on the relations.

5. **Share Information that You Know**

If you are an expert in your given field, spend some time for mentoring and sharing your expertise. When you take the time to share with others, you grow yourself.

6. **Economic empowerment of women**

Economic empowerment of women by education and micro entrepreneurship lead to the empowerment to the women in many things such as socio – economic opportunities, property rights, political representation, social equality, personal rights, family development, and market development and at last nation development.

Institutional empowerment

Strengthening organization is the way for empowering community and nation. Nevertheless, organizational or institutional empowerment can be possible through the empowerment of employees who are working in the organization. Empowerment is the process of enabling or authorizing the individual to think, behaves, take action, and control work and decision making in autonomous ways. It is state of felling self – empowered to take control one's own destiny.

When thinking about empowerment in human relations terms, try to avoid thinking of it as something that one individual does for another. This is one of problems organizations have experienced with the concept of empowerment. People think that usually the manager has to bestow empowerment on the people who report to him.

Consequently, the reporting staff members wait for the bestowing of empowerment, and the manager asks why people won't act in empowered ways .This led to a general unhappiness, mostly undeserved, with the concept of empowerment in many organizations. Therefore,

- The organization or manager has the responsibility to create a work environment which helps foster the ability and desire of employees to act in empowered ways. The work organization has the responsibility to remove the barriers that limit the ability of staff to act in empowered ways.

- In the organization perspective, Managers should have the responsibility to make the favourable environment with subordinates to get the organizational outcomes in terms of productivity, commitment, work loyalty, firm value etc.

- Applying the ideas of employees in decision making and benefiting their cooperation to improve and promotion of employees' jobs, utilizing employees' experiences and encouraging them to participate as working groups , all are effective in employees' empowerment . Therefore the most employees contribute in the organization tasks the information they get about the organization's function results of decisions made, and as the results they will feel more empowered.

- Employees should be aware of their responsibilities, duties and goals of the organizations. Providing an environment in which, employees feel they are empowered, requires that employees have a clear vision of the organization path and how they can help it.

- **Communicate the vision of the organization** – clear communication of the organizations' vision (Objective, direction and expected benefits) to stake holders is required.

- **Lead with the feet and not with the lips**; the top management should provide leadership, focus and direction. Their commitment is to ensure resources such as time, money, and energy are available and allocated properly. And they must create a sense of urgency and high priority. Same time, subordinates should ensure that they are properly working for giving their best to the achievement of organizational goals.

- Organizations or the management must allow people to solve the organizational problems themselves. Originations must create the situations people empower themselves. It means, people can take ownership of their processes and don't need to get permission to implement each and every incremental improvement ideas and strategies. Here, the management's role is to break the red tape, remove obstacles, and help avoid bureaucracy. Sense of autonomy in decision making and self efficiency resulting in increased productivity and effectiveness of organizations.

- **Establish a new mind set**; attitude change is most important in the current environment. a new attitude that "everyone is a problem solver" must replace the traditional one of "workers work and managers think" . This requires a change in every one's attitudes towards

honesty, fire, openness, communication, and treating workers as adults. Further, people need to be viewed as talented resources for solving problems and making improvements. Same time, people should show them as a capacity person to do the above and should understand the limits of the problem solving authority. Problem solving tools should also be fully understood by all members of the action team which can include flow charts, cause and effect diagrams, Pareto charts, control charts, run charts, brain storming techniques etc. Using the above tools, we can identify the root causes of the problems and make remedies for it.

- Work assignment and capacity; the management assigned the tasks to the persons according to his/ her capacity. If necessary, management should take appropriate actions to build up the capacity of the people. Entrusting all tasks at all to a particular person or particular group of people, considering the capacity, is also wrong. It may be easy to get the things done in time but we failed to train the others. Consequently the future of the organization will be damaged. Same time, people should wish and try to involve with the tasks by developing their capacity.Anyhow, management should apply the concept "right person for the right job".

- Build interpersonal skills and create an objective climate; the team leaders should prepare members to discuss the sensitive issues without the personal attacks and negligence of conflicts. In a way, we need to be minimal amount of rationalization, emotionalism, egos, anger, fear, politics, finger pointing, and defensiveness. All members in the team should learn to respect and listen to each other's ideas and opinions. People empowerment without interpersonal skill is not worthwhile.

- Establish clear performance standards; performance standards should be established and communicated to all employees in the organization. These measurements will motivate behaviour of the people.

- Motivation among employees is considered as the strategy to induce the commitment in the working environment, commitment finally can enhance the empowerment of employees in the organizations. Recognition as the motivational tool plays a vital role in empowerment. We should learn and apply to recognize,

congratulate, promote people's efforts, and reward people for a job well done. Without the recognition, people lose their motivation, enthusiasm, or commitment to solve problems and make improvements.

- In the engine world, some employees have the unfavourable mindset that can be called as occupational stress. It is a pattern of emotional, cognitive, behavioural and psychological reaction to adverse and noxious aspects of work content, work organization and work environment. Further, occupational stress is considered as the major drawback to the individual empowerment. So that, every managers should have the responsibility to find out the causes behind the stress and take the corrective action to reduce the stress level among employees.

Community Empowerment

Community is a term used to describe human population within a specific locality or district who share common interest, basic infrastructural facilities and natural resources. The United Nations defined Community Development as a process by which the efforts of the people themselves are united with those of government authorities to improve the economic, social and cultural conditions of communities and to enable them to contribute fully to national progress. (NYSC, undated): and mass participation is encouraged (Abasiekong, 1980).

Community development entails members of the community pooling their resources together, to provide functional physical and social infrastructures. These include educational and health facilities; potable water and electricity; information and communication facilities, road and transportation facilities. As well as storage, processing and marketing facilities. It also involves managing and controlling their living environment with the aim of improving the living standards of the people.

In a way the present study is focusing to empower our community – North and Eastern part of Sri Lanka. We have to think what mechanism can be adopted to empower the community in the post-war situation?
Thus the following suggestions are given for the community empowerment.

1. In the post-war situation, we can observe number of unemployed people especially in the North and Eastern part of Sri Lanka. Hence we must create employment opportunities for them including vulnerable group of people.

   The real problem in generating employment for vulnerable groups especially in under developed regions is the lack of accurate data, and systems of training support and continuous monitoring. According to official reports, there are eight thousand widows (the majority are young widows) in Northern and

Eastern Provinces of Sri Lanka. The ability of these vulnerable groups to create and develop income generating activities: self-employment or wage-employment – could improve their living conditions.

2. There is a dire need for women to be taught on how to make use of the credit facilities procured for their businesses. This can be done through "adult literacy functional education", in the area of technical entrepreneurial and managerial skill. Technical, managerial and entrepreneurial skills are the three components essential for successful operation of an enterprise.

3. **Capacity building and sustainable community development**
   Capacity building is an important strategy that helps to bring about sustainable community development. Before beginning to build capacity within programmes, practitioners need to identify pre-existing capacities such as skills, structures, partnerships, and recourses. The dimensions for community capacity include financial capacity (recourses, opportunities, and knowledge), human resources (skills, motivations, confidents and relational abilities and trust), and social resources (networks, participation structures, shared trust and bonding) (Frankish, 2003).

   Example: Paddy cultivation in Batticaloa and Cashew cultivation in Mullaitivu.

4. **Self–reliance and sustainable community development**
   This is another strategy that affects sustainable community development. Self–reliance means that the people rely on their own resources and are independent of funds sourced outside the community (Kelly, 1992). Self-reliant strategy relies on the willingness and ability of the local people to depend on their own available resources and technology which they can control and manage. It requires the optional use of all available human, natural and technological resources (Agere, 1982). Therefore, we should encourage our people specially the women towards self-reliance.

   Example: Having own business.

5. **Alleviate Poverty and Eradicate child labour**
   There has been a sharp decline in child labour over the past decade. Currently 13% of children are engaged in work, with the majority in elementary occupations – in agriculture and related activities, street vending and services, mining, construction, transport and related activities and domestic work. Most child workers are in rural areas, many of them working whilst attending school. Urban working children however, generally give up school when working. It is estimated that about

78% of working children have completed primary education.

6. **Empowering disabled persons through education, health and employment**

   In Sri Lanka, accurate statistics of disabled persons are not available. According to pilot surveys conducted on persons with disabilities, approximately 7 per cent of the population is disabled. The majority of the disabled persons are poor, as they lack access to education, health services, income generating activities and wage employment.

7. **Vocational training and skill development for disabled persons**

   Limited opportunities are available for these groups for vocational training and skills development. The available facilities also are not up to acceptable standard and are unable to meet current labour market requirements for productive employment.

   Adequate information or statistics on the employability of persons with disabilities, trained at government/ private vocational training institutions, are not available.

Even though there has been an increase in the school participation of disabled children and the number of disabled persons seeking vocational training, mechanisms to absorb them into the labour market have not been developed.

8. **Attitude change towards disabled**

   Barriers to their seeking employment are mainly due to lack of required entry qualifications. Transport difficulties and inadequate disabled-friendly working environment discourage persons with disabilities from participating in the workforce and also in vocational training. Negative attitudes of the society towards the disabled and their families also hinder their workforce participation.

Given that the disabled are also amongst the poorest and the most vulnerable in the society, and highly dependent on others, measures to empower them and to integrate them into society will benefit them, their families and the society as a whole. This issue is not sufficiently addressed at development forums. There are only a few donor-supported projects/programmes that are directed at protecting the rights of disabled people through social and economic inclusion.

9. **Re-establishing the industrial base in Northern & Eastern part of the country.**

By re-establishing the industrial base in Northern and Eastern Provinces, which was destroyed during the war, large numbers of employment opportunities will be created for both men and women. Investments in employment intensive infrastructure development work as well as in employment intensive productive activities in these two regions are critical.

10. Solving land related problems in Northern & Eastern part of the country.

Most people in the North and the East are depending on agricultural and fishing activities. In order to promote these activities, land-related problems persisting after the conclusion of the war should be resolved soon and maritime fishing should be facilitated. These measures will improve job opportunities for women and elderly people as well.

11. New partnerships with civil society and community-based organizations

It should be formed to assist community development and social well-being within poor urban and rural communities, and to improve access to essential services. These measures will no doubt lead to expanded employment opportunities.

Summary

In this talk I discussed about the empowerment of people, institution & community Definition of empowerment, Factors, Determining empowerment and the way to empower the people, institution & the community are clearly described. Hopefully it would be use full for readers, researches and the organizations for their activities and decision making.

References

1. Moye Melinda.J and Henkin Alan.B.(2006); Exploring association between employee empowerment and interpersonal trust in manager, journal of management development, (Vol No.2, pp.101-117)
2. Geisler David.(2005); the rent level in employee empowerment quality progress, research library (Cork Vol.38, No.6, pp48-52)
3. Yazdanpanah Ahmad Ali. (2005); The impact of information technology in human resources empowerment in developing countries administrative reform, 8th period, No-48, management and planning organization.
4. Saber Ghorbani, Roghayye Alilou & Leyla Noubari.(2012); Investigation effective factors on employees empowerment in Islamic Azad university, Sarab branch, journal of basic and applied scientific research 2(5) pp.4854-4860.
5. Motieei Langroodi.S.H, Ghadiri Maesoum.M, Dadvar Khani.F, Yadollahi Farsi.F & Torkashvand.Z; (2012) Explain the factors affecting rural empowerment in entrepreneurship development: case study: samen and zand cunties of Malayer Township; Human geography research quarterly, No.80: pp.17-19.
6. Sathiabama.K. (2010); Rural women empowerment and entrepreneurship development; ess student papers.
7. Ifenkwe.E.G. (2012); Mobilizing and empowering youths for sustainable community and rural development in Nigeria. International journal of academic research in progressive education and development; Vol.1, No.2, pp.144-152.
8. Hedayat Allah Nikkhah and Marof Bin Redzuan.(2010); The role of NGOs in promoting empowerment for sustainable community development; J Hum Ecol, 30(2); 85-92.
9. Mattew Borode. (2011); Empowering women through credit facilities for sustainable development in the developing countries; International journal of vocational and technical education, Vol.3, No.4, pp.49-52.

10. Nwachukum.T.A. (1994); Psychology of Learning: Ike and AWICE, odennigwe street Nsukka.
11. Mgwoke.I.B. (1992). The catholic youth in an Adult church in: The youth the church and the state Akukwe and llozumba (Eds). Catholic youth organization of Nigeria, Enugu.
12. Okogie.A.O. (1992); The youth and the Catholic Church in Nigeria In: The youth, the church and the state Akukwe and llozumba Eds. Catholic youth organization of Nigeria, Enugu.
13. Adedoyin.S.F. (2005); youth and children programming in extension. Agricultural extension in Nigeria. S.F.Adedoyin (ed) Agricultural extension society of Nigeria, ARMTI, llorin.
14. Agere. S.T (1982), Conceptual Frame Work On Self-Reliance in Community Development in Zimbabwe. International Social Work, 25(13);13-22.
15. Frankish. J (2003), Conceptualization and Measurement of Community Capacity, Applied Research and Analysis Directorate (ARAD) Canada.
16. Kelly. L (1992), Community Development: From Technology to Transformation, Ph.D Thesis, Melbourne University.

CLEANER PRODUCTION: A MOVE TOWARDS SUSTAINABILITY

Meena Senthilnanthanan, Department of Chemistry, University of Jaffna

Chairperson, JSA (Section A), 2012-2013

Introduction

Expectations of increasingly higher living standards along with rapid industrial developments have resulted in a dramatic rise in the level of pollution of the natural environment.

In any manufacturing or industrial process, raw materials, water, energy, labour and machinery are used to produce a desired final product. This final product is usually accompanied by some raw material that has not been completely utilized within the process or a by-product. Often, the design of manufacturing process is such that it uses energy inefficiently. Both these factors lead to environmental pollution – material waste as solid waste, wastewater and gaseous emissions.

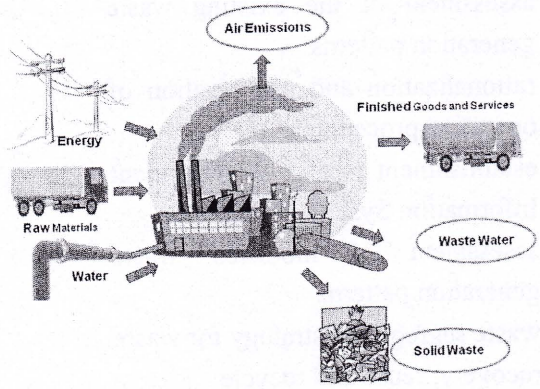


Fig. 1: Production / Service Process

Along with rapid industrialization, there is a growing concern about healthy life which requires a good quality environment and hence the control of pollution. Nowadays, environmental scientists are in the process of combining all these three aspects, industrialization, clean environment and healthy life, based on a novel concept of ***Cleaner Production (CP)***.

What is Cleaner Production?

In 1991, the United Nations Environment Programme defined CP as "***the continuous application of an integrated preventative environmental strategy to processes, products and services to increase efficiency and reduce risks to humans and the environment***".

The philosophy behind CP is that "***waste is a valuable resource at a wrong place, in a wrong form or in a wrong media***". It is an approach to optimize the utilization of resources by minimizing waste of resources at the point of generation, converting unavoidable wastes to products with economic value and innovation and creativity.

CP Techniques

Several complementary CP techniques or practices are possible, ranging from low or even no cost solutions to high investment, advanced clean technologies.

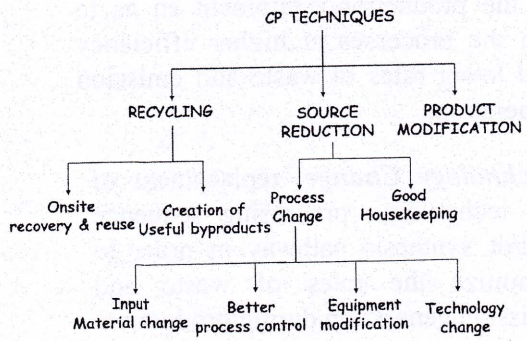


Fig. 2: Classification of CP Techniques

Product Modification: modification of product characteristics in order to minimize the environmental impacts of the product during or after its use (disposal) or to minimize the environmental impacts of its production.

On-Site Recovery/Reuse: reuse of the wasted materials in the same process or for another useful application within the company.

Production of Useful By-Products: transformation of previously discarded wastes into materials that can be reused or recycled for another application outside the company.

Good Housekeeping: appropriate provisions to prevent leaks and spills and to achieve proper, standardized operation and maintenance procedures and practices.

Input Material Change: replacement of hazardous or non-renewable inputs by less hazardous or renewable materials or by materials with a longer service life-time.

Better Process Control: modification of the working procedures, machine instructions and process record keeping for operating the processes at higher efficiency and lower rates of waste and emission generation.

Equipment Modification: modification of the production equipment so as to run the processes at higher efficiency and lower rates of waste and emission generation.

Technology Change: replacement of the technology, processing sequence and/or synthesis pathway in order to minimize the rates of waste and emission generation during production

The CP strategies are applicable to processes, products and services. The application of these techniques results in the conservation of raw materials and energy, elimination of toxic materials and reduction of quantity and toxicity of all emissions and wastes during manufacturing processes; lowers costs, improves environmental performance and reduces environmental impact of a product in its entire life cycle from raw material extraction to end-of-life disposal; focuses on product use and incorporates environmental concerns when designing and delivering a service.

CP Assessment

The effective CP implementation involves a thorough assessment of the production process and the waste generation potential. This requires specific expertise in different aspects of the industry such as,

- commitment of the top management
- total involvement of employees
- assessment of the existing waste generation patterns
- rationalization and optimization of operating procedures
- establishment of Management Information System (MIS)
- assessment of modified waste generation patterns
- waste segregation strategy for waste recovery, reuse and recycle
- Techno-economic evaluation of enabling technologies
- possible changes in the equipment, process and raw materials
- overall economic assessment of the CP programme

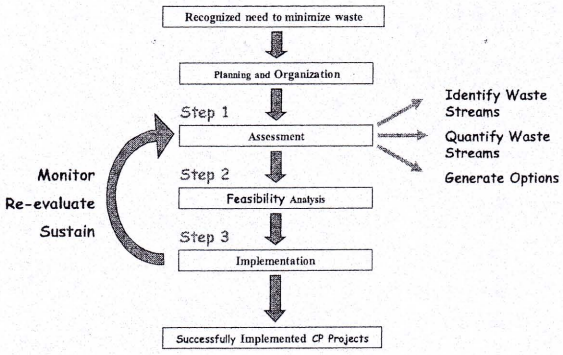


Fig. 3: CP Assessment Methodology

CP Tools

Usually, the industries are not aware of what is wasted?

where is it generated? and

how much is wasted?

The CP tools such as process flow diagrams, product life cycles and material and energy balances are used during CP assessments to identify the types of wastes, sources of waste generation and quantify the wastes.

A process flow diagram (PFD) is a pictorial representation of what is happening in a process in a sequential order. It is a paper based tool that shows a snapshot of the process from which the type and source of wastes could be identified.

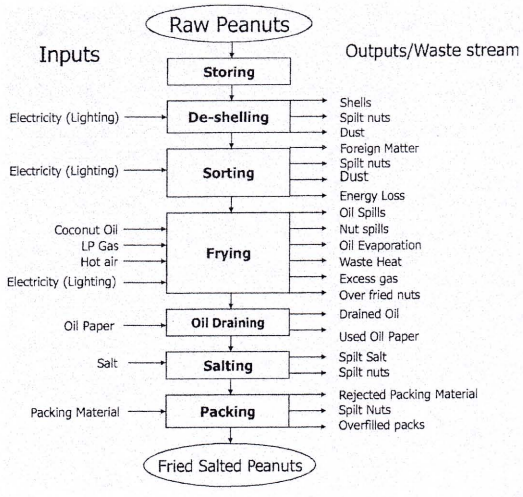


Fig. 4: PFD for preparation of fried, salted peanuts

A product life cycle depicts the phases of life of a product from its conception to end-of-life. Life cycle thinking accepts that all stages of life cycle are interdependent and leads from one to the other.

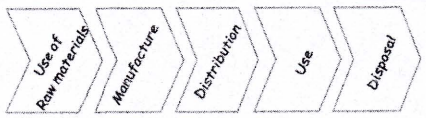


Fig. 5: Product Life Cycle

The material and energy balances are used to quantify the wastes. The material balance is based on the law of conservation of mass.

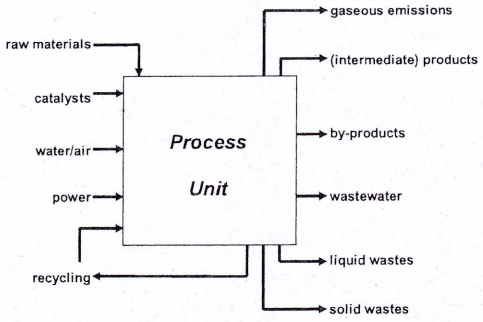


Fig. 6: Material & Energy Balances

After quantifying the wastes, a cost analysis will be conducted followed by identification of root causes of the waste streams. Based on the above CP assessment, a number of simple and obvious options to reduce waste generation will be developed and selected options based on a feasibility analysis will be implemented, monitored, reviewed and sustained.

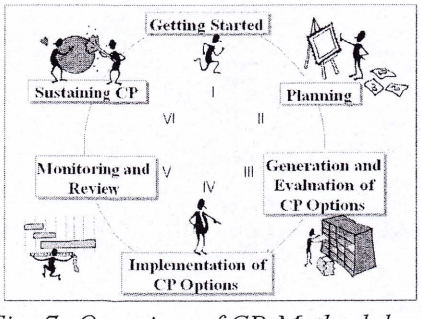


Fig. 7: Overview of CP Methodology

Summary

CP is a preventive approach to environmental management and a sound business strategy (WIN-WIN strategy) in terms of economic considerations.

Role of livestock in food security

J.Sinniah,
Department of Animal Science, University of Jaffna.

Introduction

A widely used definition, dating back to the World Food Summit in 1996, is that food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Smith *et al.*, 2013). Food security, as commonly used in development discourse, emphasizes food quantity more than food quality: the term "nutrition security" is used to capture the quality dimension.

More than a billion people around the world live in extreme poverty, and the number is rising. There have been marked increases in hunger and as of 2009, the Food and Agriculture Organization of the United Nations (FAO) estimates that 1.02 billion people are undernourished (FAO, 2009). Most of these people are found in sub-Saharan Africa and South and East Asia. Throughout the developing world poverty is linked to hunger and every other person in sub-Saharan Africa is considered poor, i.e., lives on less than one US dollar a day. It is estimated that 30% or more of children under 5 years of age are malnourished in many parts of this region (Philipsson *et al.*, 2011).

Availability of affordable food of livestock origin would contribute to alleviating this catastrophe. However, the challenge of adequately feeding people in the future is exacerbated by the fact that the global population increases by some 90 million people annually. This means that the world's farmers will have to increase their production by 50% to feed about 2 billion more people in the next 35 years (Watson, 2001).

The contributions made to the diets of the world's seven billion people by cattle, sheep, goats, pigs, chickens, and a dozen or so lesser known but locally important species (such as guinea fowl, yaks, and camels) are complex and multidimensional. They include direct and indirect impacts, which can be either beneficial or harmful to overall food supply and food and nutrition security (Smith *et al.*, 2013).

Measuring food security

Six dimensions

FAO defines four "pillars" of food security and two temporal dimensions related to food insecurity, all of which must be addressed in efforts to reach hunger reduction targets.

Four pillars of food security

Food Availability: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).

Food access: Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).

Stability: To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

Utilization: Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.

Paying simultaneous attention to all four pillars is a constant challenge. Sufficient food can be produced today to feed everyone in the world, but it is not always available in every country, let alone every community. Some countries produce enough food to be self

sufficient while others rely on imports, meaning that when international prices rise or global value chains break down, the food supply becomes unstable. Even when food is available, many people cannot afford to buy what they need for a healthy diet and, in parallel, prices that can be paid by the poorest consumers may not be sufficient to provide a living for producers. Waste in food chains from oversupply and spoilage adds to costs and reduces the amount available to eat (FAO, 2011).

Dimensions

The temporal dimensions normally refer to food insecurity, which can be **chronic**, resulting from a persistent shortage in supply or a systemic weakness that limits individuals' ability to access food, or **transitory**, arising because of a crisis. Both need to be addressed at the same time (Pingali *et al.*, 2005), because individuals and communities facing chronic food insecurity lack safety nets and are highly vulnerable to transitory problems, while an inappropriate response to a crisis may weaken the base for long-term food security by weakening local markets or creating dependencies. In 2005, the Committee on World Food Security (FAO, 2005) identified conflict as the most common cause of transitory food insecurity, followed by weather-related problems. In 2008 and 2009, the food security repercussions of the world economic crisis were a serious cause for concern (FAO, 2009). As a result of transitory problems starting to blur into chronic food insecurity, mainly due to long-term systemic failures in the way that food is produced and distributed, the world is now facing the problem of protracted food crises (FAO, 2010 a).

Measures

There is no one method to measure all of food security's dimensions, determine whether a food system is sustainable and resilient, and quantify the extent to which everyone in the world is consistently well nourished. Thus, it is necessary to rely on a range of measures that address the various aspects of food security.

The most direct, widely available and uniform measurement quantifies the consumption of calories: people who consume insufficient calories for their age and sex are considered undernourished (FAO, 2011). When the target was set by the World Food Summit Rome Declaration in 1996 to reduce hunger by half by 2015, there was already a promising trend in combating under nutrition. The number of undernourished people, standing at close to a billion in 1970, fell to 900 million in 1980, and to 845 million in 1990–92 (Table 1).

Table 1: Number (Millions) and share of undernourished people by region 1990 to 2007

Country Groups	1990-1992	1995-1997	2000-2002	2005-2007
World	843.4	787.5	833.0	847.5
Developed countries	16.7 (2.0%)	19.4 (2.5%)	17.0 (2.0%)	12.3 (1.5%)
Developing world	826.6 (98.0%)	768.1 (97.5%)	816.0 (98.0%)	835.2 (98.5%)
Asia and the Pacific	587.9 (69.7%)	498.1 (63.3%)	531.8 (63.8%)	554.5 (65.4%)
Latin America and the Caribbean	54.3 (6.4%)	53.3 (6.8%)	50.7 (6.1%)	47.1 (5.6%)
Near East and North Africa	19.6 (2.3%)	29.5 (3.7%)	31.8 (3.8%)	32.4 (3.8%)
Sub-Saharan Africa	164.9 (19.6%)	187.2 (23.8%)	201.7 (24.2%)	201.2 (23.7%)

Note: Percentages are share of total for the year.

Source: FAOSTAT.

Numbers stayed fairly static for the next ten years, rising slightly to 873 million in 2005. In percentage terms, the numbers were even more encouraging. In 1980, 28 percent of the world's population was undernourished. By 1990–92, the average had fallen to 16 percent for the world and 20 percent for developing countries, and in 2005–07 (the latest period for which comparable statistics are available), the figures stood at 13 percent for world population and 16 percent for developing countries (FAO, 2008). Since then, two global problems, increasing demand for biofuel and the world economic crisis, have created a serious block to halving hunger.

Competition between food and fuel crops together with other factors resulted in rises in food prices in 2007 and the wider economic crisis that immediately followed reduced purchasing power. According to estimates, approximately 925 million people were undernourished in 2010, representing roughly 14 percent of the world's population of 6.8 billion. FAO databases show that undernourishment is unevenly distributed across regions, nations, households and individuals, with the main burden borne by the poorest countries and the poorest people. Under nourishment is an important indicator of food insecurity, but it only tells part of the story. Food security is more than the consumption of sufficient calories; it is also about consuming food of adequate quality. People are malnourished if they eat insufficient calories or protein, food of poor quality, or if they are unable to utilize fully the food they eat (WHO, 2001). Diets can be poor if they lack minerals and vitamins, have insufficient fruits, vegetables or livestock products, or contain too much of elements that are harmful when taken in excess such as saturated fats and sugar (IFPRI, 2004). While 925 million people were undernourished in 2010, some 2 billion were estimated to be malnourished. Unlike under nourishment, which is associated with poverty, the problem of malnourishment is found across all income groups, although it takes different forms for the poor and the rich. The poorest lack an adequate supply of energy, protein and micronutrients, while for those who can afford sufficient calories, over consumption and poorly balanced diets, together with their associated health problems, are an increasing problem (WHO, 2003).

Malnourishment is harder to measure than under nourishment, since it requires data on protein and micronutrients which are not routinely measured on a wide scale. Rough estimates can be made from the kilograms of different foods consumed and their average content of different nutrients. More commonly, malnourishment levels are deduced indirectly from proxy measures that show its resulting effects. Malnutrition has a

devastating effect on child survival, particularly in developing countries.

It has been estimated that protein-energy malnutrition is a causative factor in 49 percent of the approximately 10.4 million annual deaths of children under five years of age (WHO, 2000). It is also manifested in underweight and stunting. In 2007, UNICEF estimated that approximately 146 million children were underweight (UNICEF, 2007), over 70 percent of them in developing countries, and that 31.2 percent of children in developing countries were stunted (UNSC, 2010). This represented an improvement since 1980, when 49 percent of children under five in the developing world were stunted, and 38 percent were underweight (Opio, 2007). At the other end of the scale, over-consumption can be deduced from statistics on obesity, defined as having a Body Mass Index (BMI), which measures body fat based on weight and height, of 30 or above.

The most recent WHO global summary suggests that in 2008, at least 500 million adults were clinically obese (WHO, 2010), a figure which may rise to 700 million in 2015. Obesity is linked to diabetes and heart disease and possibly certain kinds of cancer. Malnutrition not only affects an individual's health, it is expensive for society. It reduces human productivity and creates costs for the health system.

Livestock food in the diet

Nutritional Value

Livestock contribute around 12.9 percent of global calories and 27.9 percent of protein directly through provision of meat, milk, eggs and offal, and also contribute to crop production through the provision of transport and manure. Meat, milk and eggs provide proteins with a wide range of amino acids that match human needs as well as bio-available micro-nutrients such as iron, zinc, vitamin A, vitamin B12 and calcium in which many malnourished people are deficient. It is generally agreed that livestock source foods can be beneficial, but there are no universal guidelines that set an ideal level of consumption of livestock products for an individual. International dietary guidelines on levels of energy and protein consumption do not distinguish between plant and animal sources.

They suggest that the intake of energy needed by an adult in a day varies from 1680 to 1990 kilocalories (kcals) in total, depending on the country. They also suggest that the safe level of protein consumption is about 58 g per adult per day. "Safe" in this case is defined as the average protein requirement of the individuals in the population, plus twice the standard deviation and it is an accepted practice to refer to this measure rather than a minimum (WHO, FAO, UNU, 2007). In most parts of the world, average consumption is above the minimum recommended level of energy and the safe level of protein, according to the most recent comparable consumption statistics. As shown in Table 2, only in sub-Saharan Africa is the average consumption of protein below the recommended safe levels.

However, these averages hide a significant problem of malnutrition, with 16 percent of people in the developing world (28 percent in sub-Saharan Africa) estimated to be undernourished. Energy and protein consumption are quite closely linked, and insufficient calorie consumption tends to go in tandem with insufficient protein consumption. These are average guidelines. Actual individual requirements depend on height, age, lifestyle and stage of life.

Excessive or inappropriate intake of livestock products creates risks and detrimental health effects. Increased consumption of red meats can increase the risk of colon cancer, and increased intake of saturated fats and cholesterol from meat, dairy products and eggs can increase the risk of chronic non-communicable diseases such as cardiovascular disease (UNSCN, 2005). National dietary guidelines typically warn against consumption of too much animal fat from meat and hard cheese and suggest a balance between livestock products and fish.

Table 2: Average dietary protein and energy consumption and under nourishment by region

Country groups	Protein consumption g/day 2003-05	Energy consumption kcals/day 2005-07	Percent of population consuming insufficient calories 2005-07
World	76	2780	13
Developed countries	102	3420	<5
Developing countries	70	2630	16
United States of America	116	3770	<5
Asia, the Pacific and Oceania	70	2610	16
Latin America and the Caribbean	79	2900	8
Near East and North Africa	83	3130	7
Sub-Saharan Africa	53	2240	28
Recommended "Safe" consumption (adults)	58		
Minimum energy requirement		1680-1990	

Sources: FAOSTAT for all except "safe" consumption.
Recommended "safe" consumption is estimated as the minimum average plus 2x standards deviation WHO, FAO, UNU (2007)

Since protein with a wide range of amino acids is a valuable dietary contribution from livestock, the range in livestock protein intake levels according to geographic area is worth examining.

Table 3 shows that the consumption per person of livestock protein increased in all areas of the world between 1995 and 2005. However, it also shows that average consumption in Africa remained at less than a quarter of that in the Americas, Europe and Oceania, and Africa's livestock protein consumption was a modest 17 percent of the recommended safe level for all proteins. By contrast, the consumption of livestock protein in the Americas, Europe and Oceania in 2005 was between 78 and 98 percent of the total protein requirement, suggesting that livestock products were being over consumed.

The high level of meat and saturated fat consumption in high-income countries has been associated with high rates of cardiovascular disease, diabetes and some cancers (Walker *et al.*, 2005). Even in small amounts, food of animal origin can play an important role in improving the nutritional status of low income households by addressing micro and macronutrient deficiencies, particularly of children and pregnant and lactating women (FAO, 2011).

Table 3: Average daily consumption per person of livestock protein compared to safe level 1995 and 2005

Area	Year	g/day Meat	Dairy (Not butter)	Eggs	Total	% of Recommended "safe" consumption from livestock
Africa	1995	5.3	3.1	0.6	9	
	2005	5.9	3.4	0.6	9.9	17
Americas	1995	26.1	14.3	2.7	43.1	
	2005	28.1	14.1	3.1	45.3	78
Asia	1995	7.5	3.8	2.2	13.5	
	2005	9.2	4.7	2.7	16.6	29
Europe	1995	24.1	17.9	3.6	45.6	
	2005	24.7	19.2	3.8	47.7	82
Oceania	1995	24.9	18	1.9	44.8	
	2005	39.3	15.8	1.7	56.8	98
Least developed countries	1995	3.3	2.2	0.2	5.7	
	2005	4.1	2.7	0.3	7.1	12

Source: FAOSTAT for consumption figures. Recommended "safe" consumption is 58g per person per day, estimated as the minimum average plus 2x standard deviation (WHO, FAO, UNU, 2007.)

Supply of animal source foods

The availability of livestock products worldwide and within nations is determined by the volume of production and the scale and reach of international trade. During the past 40 years (1967– 2007), global production of meat, milk and eggs has grown steadily. Particularly striking have been the increases in production of poultry meat by a factor of 7.0, eggs by a factor of 3.5, and pig meat by a factor of 3.0 (Table 4) (FAO, 2011).

Trade in livestock products also has grown enormously during these 40 years (Table 5), by a factor of 30.0 for poultry meat, more than 7.0 for pig meat and 5.0 for milk.

While the global supply of livestock products has more than kept up with the human population expansion, the situation has not been the same in all regions. Production levels have expanded rapidly in East and Southeast Asia, and in Latin America and the Caribbean, but growth in sub-Saharan Africa has been very slow.

Fast growth in human populations in some developing countries coupled with low productivity per animal has made it hard for livestock production in those areas to keep up. There is also considerable variation within the developing world, with sub-Saharan Africa and South Asia producing at much lower levels per person than Latin America and the Caribbean.

Indirect effects of livestock on food security

Income generation: By generating cash incomes from the sales of animals, their products, or services, or through employment along animal-source food value chains, livestock in poor countries contribute to food security by providing income that can be used to purchase staple food.

Table 4: Changes in global livestock production total and per person 1967 to 2007

Source: FAOSTAT

Item	Production (million tonnes)			Production per person (kg)		
	1967	2007	2007/1967	1967	2007	2007/1967
Pig meat	33.86	99.53	294%	9.79	14.92	152%
Beef and buffalo meat	36.50	65.61	180%	10.55	9.84	93%
Eggs, primary	18.16	64.03	353%	5.25	9.60	183%
Milk, total	381.81	680.66	178%	110.34	102.04	92%
Poultry meat	12.39	88.02	711%	3.58	13.20	369%
Sheep and goat meat	6.49	13.11	202%	1.88	1.97	105%

Table 5: Average consumption (in kilograms/capita/year) of meat, eggs and milk by region

*Using the developed/developing country groupings of the IFPRI IMPACT model
Source: FAO Stat (7); data downloaded on 5 November, 2010 b

Food item	Developing countries	Developed countries	Sub-Saharan Africa	South Asia	East Asia	Latin America & Caribbean	World
			1980				
Bovine meat	10.74	21.62	6.90	3.25	5.75	19.62	10.57
Eggs	4.05	12.14	1.12	1.01	4.29	5.96	5.59
Pig meat	6.77	27.99	1.30	0.18	5.49	6.76	11.87
Poultry meat	6.85	14.74	1.76	0.59	4.57	7.97	5.76
Milk (excluding butter)	69.54	217.03	34.85	43.14	22.53	94.43	76.86
			1990				
Bovine meat	9.95	20.07	6.39	3.62	5.88	16.70	10.32
Eggs	4.27	11.55	1.16	1.36	4.94	6.07	6.36
Pig meat	7.27	31.16	1.49	0.22	8.08	6.31	13.12
Poultry meat	9.56	18.27	0.86	6.48	9.80	7.63	
Milk (excluding butter)	64.99	214.49	30.74	48.18	23.25	80.93	77.02
			2000				
Bovine meat	9.80	19.55	5.77	3.55	6.53	17.06	9.53
Eggs	4.71	10.78	1.24	1.59	5.92	6.28	8.08
Pig meat	8.47	35.34	1.71	0.23	9.08	7.99	14.85
Poultry meat	12.64	25.15	3.12	1.49	10.42	18.53	10.93
Milk (excluding butter)	81.33	212.25	31.40	58.63	31.33	93.40	77.61
			2007				
Bovine meat	9.43	20.33	5.96	3.77	5.2	14.84	9.59
Eggs	5.32	11.14	1.29	1.79	7.26	7.16	8.57
Pig meat	10.02	34.09	1.85	0.22	11.95	9.42	15.05
Poultry meat	15.27	28.73	4.14	2.14	12.85	22.57	12.62
Milk (excluding butter)	88.53	210.59	31.05	64.18	37.02	93.19	84.93

Livestock underpinning smallholder agriculture

In addition to the direct production of much of the world's red meat and milk, mixed crop–livestock systems produce 50% of cereals (Herrero *et al.*, 2010). Livestock contribute to this staple food production by providing manure, contributing to land preparation, and providing ready cash to buy planting materials or fertilizer or to hire labor for planting, weeding, or harvesting. Livestock contributions can thus increase the area of land cultivated, the yields and productivity achieved, the feed produced from crop residues, and, through enhanced nutrient recycling, the sustainability of those farming systems.

Zoonotic diseases and food safety

Livestock can also impact food security by transmitting diseases to people via vectors such as biting flies and through contaminated animal source foods; these diseases limit productivity of people by reducing their ability to produce food themselves or to work to earn income to purchase food.

Over consumption of animal source foods

Over consumption of animal-source foods can harm human health and well-being, impacting whole societies as well as individual households.

Livestock and climate change

In the longer term, livestock production can impact negatively on food security through production of greenhouse gases that contribute to climate change.

In tropical regions, climate change is expected to result in significant yield reductions, although in temperate regions, the impacts might be beneficial in places (Nelson et al., 2009).

Future prospects

Over the coming decades, population growth, urbanization, and income growth, especially in developing countries, will result in huge increases in demand for milk, meat, and eggs. Meeting that demand will place enormous pressure on the global food system. This has led some authorities to call for a global rebalancing: those who eat too little animal-source foods should eat more; those who eat too much should eat less. Mixed crop–livestock farming systems currently produce most of the world's meat, milk, and staple crops.

A major question for the future is whether smallholder agriculture can remain competitive. Addressing the role of mixed crop–livestock systems in the future, including issues such as efficiency of production as well as the complexities of market engagement, is crucial to address whatever trajectory of change these systems undergo in the coming decades if they are to contribute to food security in a way that is equitable, environmentally sustainable, economically viable (Capper, 2011), and good for human health.

References

1. Capper, J.L. 2011. Replacing rose-tinted spectacles with a high-powered microscope: The historical versus modern carbon footprint of animal agriculture. Anim. Front. 1(1):26–32.
2. FAO, 2005 Report of the 31th Session of the Committee on World Food Security (Rome, 23-26 May 2005).
3. FAO. 2007. Food Outlook Global Market Analysis - Poultry Meat (available at http://www.thepoultrysite.com/articles /918/foodoutlook- global-market-analysis-poultry meat.
4. FAO. 2008. State of Food Insecurity in the World 2008: High food prices and food security threats and opportunities. FAO, Rome ftp:// ftp.fao.org /docrep/fao/ 011/i0291e/ i0291e00.pdf.
5. FAO. 2009. *State of Food Insecurity in the World 2009.* FAO, Rome
6. FAO. 2010a. *State of Food Insecurity in the World 2010: Addressing food insecurity in protracted crises*, FAO Rome (available at

http://www.fao.org/docrep/013/i1683e/i1683e.pdf).

7. Food and Agriculture Organization of the United Nations (2010 b). – FAOStat statistical data. Available at: faostat.fao.org/default.aspx (accessed on 5 November 2010).
8. FAO (2011) *FAO 2011, Livestock in food security*, FAO, Rome.
9. Herrero, M., P. K. Thornton, A. M. Notenbaert, S. Wood, S. Msangi, H. A. Freeman, D. Bossio, J. Dixon, M. Peters, J. van de Steeg, J. Lynam, P. Parthasarathy Rao, S. MacMillan, B. Gerard, J. McDermott, C. Seré, and M. Rosegrant. 2010. Smart investments in sustainable food production: Revisiting mixed crop–livestock systems. Science 327:822–825.
10. IFPRI. 2004. Research and Outreach: Food Systems Governance. Washington DC: IFPRI.
11. Nelson, G. C., M. W. Rosegrant, J. Koo, R. Robertson, T. Sulser, T. Zhu, C. Ringler, S. Msangi, A. Palazzo, M. Batka, M. Magalhaes, R. Valmonte-Santos, M. Ewing, and D. Lee. 2009. Climate change: Impact on agriculture and costs of adaptation. International Food Policy Research Institute, Washington, DC.
12. Opio, C. 2007. Background paper for H. Steinfeld, H. Mooney, F. Schneider & L. Neville, eds. Livestock in a changing landscape, Vol. 1: Drivers, consequences, and responses. Washington, DC, Island Press.
13. Philipsson J., Zonabend E., Bett, R.C. and Okeyo A.M. 2011. Global perspectives on animal genetic resources for sustainable agriculture and food production in the tropics In: Animal Genetics Training Resource, version 3, 2011.
14. Pingali, P., Alinovi, L. & Sutton, J. 2005. Food security in complex emergencies: enhancing food system resilience *In Disasters,* 29(s1) UK & USA, Blackwell Publishing.
15. Smith, J., K. Sones, D. Grace, S. MacMillan, S. Tarawali, and M. Herrero. 2013. Beyond milk, meat, and eggs: Role of livestock in food and nutrition security. Smith et al.,, Vol. 3(1): 9-12
16. UNICEF. 2007. The State of the World's Children 2007. New York.
17. UN Standing Committee on Nutrition. 2005. Overweight and Obesity: A New Nutrition Emergency? SCN News No. 29.
18. UN Standing Committee on Nutrition 2010. 6th Report on the World Nutrition Situation (available at http:// www. unscn. org/ files /Publications/ RWNS6/ report/ SCN_ report. pdf).
19. Walker, P., Rhubart-Berg, P., McKenzie, S., Kelling, K. & Lawrence, R.S. 2005. Public health implications of meat production and consumption. Public Health Nutrition: 8(4), 348–356.
20. Watson, R.T. 2001. The challenge of climate change: Poor Farmers at risk. In: CGIAR (Consultative Group on International Agricultural Research). CGIAR Annual Report 2000. CGIAR Secretariat, the World Bank, Washington, DC, pp. 8-12.
21. WHO. 2000. Manual on the Management of Nutrition in Major Emergencies. IFRC/UNHCR/ WFP/WHO. Geneva: WHO.
22. WHO. 2001. Water, Sanitation and Health: Water Related Diseases (available at http://www. who.int/ water_sanitation _health/diseases/malnutrition/en.) Accessed January 2010.
23. WHO. 2003. Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/ FAO expert consultation, Geneva, 28 January – 1 February 2002
24. WHO.int/water_sanitation_health/disease s/ malnutrition/en.) Accessed January 2010.

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

Mr.A.Nithlavarnan, Lecturer, Department of Education, University of Jaffna, Sri Lanka

Introduction

People around the world recognize that current economic development trends are not sustainable. Public awareness, education and training are keys to moving society toward sustainability. Education for Sustainable Development (ESD) is recognized internationally as an important contributor to a more equitable, and sustainable society.

Based on the plan of Implementation agreed on at the World summit on Sustainable Development held in Johannesburg 2002 the United Nations has declared the period 2005-2014 as the Decade of Education for Sustainable Development. UNESCO has been given the responsibility to lead education reforms where the links between environmental, social and economic dimensions of life are given special attention and where democracy and equity and mainstreamed throughout the education system.

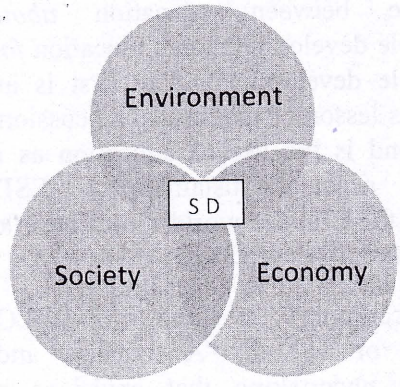
In most countries there are on going processes of developing or implementing national strategies for sustainable development. These processes include more dimensions of the formal education system such as policy, strategy, curricula, teacher training and material development.

In this particular article describe about ESD in detail under the following sub themes.

- Definition of "Sustainable Development"(SD)
- Need for Sustainable Development
- Definition of the concept of "Education for Sustainable Development"(ESD)
- Important aspects of ESD
- Aims and role of ESD
- Suggested sub themes in achieving Millennium Development Goals (MDG) through ESD.
- Global good practices and initiation in Sri Lanka
- Challenges and barriers to ESD
- Improving strategies of ESD

Sustainable Development (SD)

Sustainable development is a difficult concept to define; because it is also continually evolving. It was first endorsed at UN General Assembly in 1987. One of the original descriptions of Sustainable development is credited to the Brundland Commission that is "Sustainable development is have three components/pillars; Environment, society and economy. Considering the three to be overlapping circles of same size, the area overlapping in the centre is human well being.



Sri Lanka's vision of Sustainable Development

Sri Lanka's vision of Sustainable Development is an advanced, prosperous, stable, equitable, peaceful, healthy, and environmentally sound nation that will be durable and resilient.

Need for sustainable development

We can rapidly create a laundry list of problems – such as inefficient use of energy, lack of water conservation, increased pollution, abuses of human rights, over use of personal Transportation, Consumerism and climate change.

Education for Sustainable Development (ESD)

People using three terms synonymously and interchangeably, such as Education for Sustainable Development (ESD), Education for Sustainability (EfS) and sustainability education (SE). ESD is use most often, because it is the terminology used frequently at the international level and within UN documents. Locally or nationally, the ESD effort may be named or described in many ways because of language and cultural differences. As with all work related to sustainable development, the name and content must be locally relevant and culturally appropriate.

An important distinction is the difference between education *about* sustainable development and education *for* sustainable development. The first is an awareness lesson or theoretical discussion. The second is the use of education as a tool to achieve sustainability. ESD promises to make the world more liveable for these future generations.

According to the UNESCO definition of ESD is "A dynamic and expensive undertaking that envisions a world where every person has the chance to benefit from educational opportunities and to learn necessary to create a sustainable future".

ESD is based on the premise of "learning by doing". Each cultural /societal group will choose to address ESD in the context of its own aspirations for sustainable development.

Important aspects of ESD

The following are the important aspects of ESD processes

1. Future thinking: actively involves stakeholders in creating and enacting an alternative future.
2. Critical thinking: helps individuals assess the appropriateness assumptions that current dominant forms of development are necessarily and desirable.
3. System thinking: Understands and promotes holistic change.
4. Participation: Engages all in sustainability issues and challenges individual and social relations to the local and global ecosystems that we inhabit, including consumption and production.

Role of ESD

The role of education for sustainable development is to help people develop the attitudes, skills, and knowledge to make informed decisions for the benefit of themselves and others, now and for the future, and to act upon those decisions.

ESD – Related Pedagogies

Followings are the ESD-related pedagogies.

1. Project – based learning
2. Experimental learning
3. Inquiry-based learning
4. Collaborative learning
5. Participatory learning
6. Student-centred learning
7. Integration of ICT

Goal and objectives of ESD

The overall goal of Education for Sustainable Development is to develop the capacities of individuals and societies to

work for sustainable futures. It is aimed at making people more knowledgeable, better informed, ethical, responsible, critical, and willing to act for a healthy and productive life in harmony with nature. (UN Economic Commission for Europe 2005) The followings are the objectives of the ESD,

- Allowing a sustainable society to future generation.
- Realize a sustainable future with respect to the environment.
- Become leaders in a sustainable society

Suggested subthemes in achieving Millennium Development Goals through ESD

Social Sector	Environmental Sector	Economic Sector
•Human rights Education •Education for peace and equity •Education for cultural diversity •Education for Social justice •Health Education •Learning for local and indigenous knowledge. •Integrating traditional and modern technologies. •Literacy	•Natural resources •Education for Renewable Energy •Climate change education •Biodiversity conservation •Waste reclamation •Sustainable food production •Sustainable village/city	•Prevention and reduction of disasters. •Sustainable transportation •Sustainable Urbanization •Sustainable producation and consumption •Sustainablity of corporations •Poverty reduction •Narrowing the gap between the rich and poor.

Good practice examples of ESD in global level

- Communities: In small communities throughout the pacific islands, ESD approaches are helping to engage communities in decision making about their own lives.
- Formal Education: Programmes such as Peace Education, Human Rights Education, Environmental Education and "Young Entrepreneur schemes are carried out in many schools.
- Training and Research: In many European nations, Universities and technical colleges are training students of science, economics and business management in skills that may help to build more sustainable societies through energy efficient buildings, socially-conscious business, and Waste-efficient production technologies.

ESD activities in Sri Lanka

Sri Lanka as a developing country, there are so many ESD related activities going on with the help of UNESCO and private sector participation.

- ESD integrate into the curriculum.
- Conducting special projects.
- Schools' child protection
- Waste management
- Socio-cultural activities
- Established national streaming committee
- Given priority to areas of peace, health and environment.
- Conducting environmental programmes.
- Conducting school health promotion programmes.
- Formulated national policy for 'education for social cohesion and peace'(ESCP)

Challengers and Barriers to ESD

While many nations around the world have embraced the need for education to achieve sustainability, only limited progress has been made on any level. This lack of progress stems from many sources.

1. The lack of vision or awareness about ESD.
2. The lack of policy or funding.
3. Generic issues.
4. Problems about structuring and placing ESD in the Curriculum
5. Linking to Existing Issues: Educational Reform and Economic Viability.
6. Facing the Complexity of Sustainable Development Concept.
7. Problems about Developing an ESD Programme with community participation.

Improving strategies for ESD

- To develop awareness within the educational community and the public that reorienting education to achieve sustainability is essential.
- Appropriately structuring and placing ESD in the curriculum.
- Developing an ESD programme with community participation.
- Engaging Traditional Discipline in a Trans-disciplinary Framework.
- Sharing the responsibility.
- Building Human Capacity.
- To develop financial and material resources.
- To develop policy.
- To develop a creative, innovative, and risk taking climate.
- To promote sustainability in popular culture.

Conclusion

ESD is an approach to teaching and learning based on the *ideals and principles that underline sustainability* – human rights, poverty reduction, sustainable livelihoods, peace, environmental protection, democracy, health, biological and landscape diversity, climate change, gender equality, and protection of indigenous cultures. In these and many other dimensions, education for sustainable development is analogous with the vision and goals of UNESCO.