

**GREEN ECONOMY
FOR DAILY USE
CHANGING OF LIFE STYLE
FOR BETTER LIVING**

FIFTH ENLARGED EDITION

T. M. DAS

Know Your Gene (KYG)

**Be Used to Genetically Compatible Balanced Diet
prepared from Raw Fruits & Vegetables.
Our near relatives 447 nonhuman Primate species still
surviving on such diet through Ages without
any help from the Doctor, Hospital or Maternity Home.
Realize the value of a Tree. Grow your own fruits and
vegetables at any suitable space available to you.**

**T. M. DAS FOUNDATION FOR
DEVELOPMENT OF LIFE SCIENCES**

Kolkata - 700 023

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GREEN ECONOMY FOR DAILY USE

First Edition March, 2013
Second Edition April, 2013
Third Edition August, 2013
Fourth Edition March, 2014
Fifth Enlarged Edition September, 2016

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**T. M. Das Foundation for
Development of Life Sciences**

Kolkata - 700 023

Price

Rs. 100

\$3

£1.5

Collaborators

Society For Audiovisual Study on Life and Environment

(Formerly : Indian Association for Colour Transparency)

Kolkata - 700 023

Association of Biological Sciences

Kolkata - 700 019

Environmental Socio-Economic Data Management Study Centre

Kolkata - 700 023

Printed by

Media SS

Kolkata - 700 029

Mobile : 98306 10609

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**IN MEMORIUM
LABANYA MANJARI DAS**

Preface

It gives the immense pleasure to find that a fairly large number of readers have been interested about the subject matter of this book which encouraged us to publish the 5th Enlarged Edition of this book. Thanks are due to the avid readers on our behalf.

It is a universal truth that the present life style of mankind is defective and almost impossible to be maintained in the world of finite resources. In this book, from pure scientific point of view an attempt has been made to identify the major socio-economic problems that have been developed from our faulty life style along with their feasible solution in the light of sustainable natural ways and means.

Mankind belongs to Primate Order, which is sub-divided into 5 sub orders, 16 families, 72 genera and 448 species. All of them have been still surviving without any help from the Doctor, Hospital and Meternity Home, except mankind who constantly have been suffering from various kinds of diseases and health problems and requires constant medical help from the Doctor, Hospital and Meternity Home. Such unnatural situation has been developed mainly due to his abnormal life style and food habit. Like all other primate species we are unable to synthesize Vitamin C in our physiological system. Hence, it is obligatory for us to consume raw fruits and vegetables. We are true herbivores. Our natural diet is raw fruits and vegetables.

True carnivores like lions and tigers are able to synthesize Vitamin C in their body system, they do not require to consume raw fruits and vegetables, raw meat is their natural diet. Based on such natural diet, they have been surviving through Ages without any compulsion for extra medication.

This fact clearly shows the importance of basic natural diet for the survival of species. It also indicates the possibility of minimization of our growing insatiable demand for medication and hospitalization. That could be achieved through rectification of our life style with paying due importance on our basic natural diet consisting of raw fruits and vegetables. Such rectification is also imparative in the cases of using of water, energy and other natural resources. In this edition a number of new schemes on this subject have been included. We would be please if those are able to attract due attention of the people who matter.

Acknowledgement

It is my great pleasure to acknowledge the most valuable help and co-operation I received from my beloved students, friends and collaborators in writing this small but most significant booklet.

Dr. Asesh Kumar Lahiri, my student and Assistant Secretary of the Foundation, former Chief Conservator of Forests, Govt. of West Bengal and well known expert of FAO has provided me with necessary information in writing the booklet. Sri Samar Datta, my friend, Member of the Trustee Board of the Foundation and writer of original work 'Etihash Khidirpur' (History of Kidderpore) along with Amitava Chakraborty have provided me with valuable assistance in writing this booklet. Sri Bijoy Kumar Chandra, Managing Director of M/s. P. C. Chandra & Sons Pvt. Ltd., well known friend of the Tree, who already initiated a project on Tree Plantation has given the active support in the development of different models of low cost Solar Cooker for common people of our country. Sri Janaki Ballav Banerjee, my bosom friend and arch rival from my school days helped me publish this work in proper order. Dr. Sunita Chandra, a well known geographer and dietitian has provided me with necessary information about food and nutrition. I am also indebted to Sri Ranajit Pal, an eminent Science Writer on Food and Nutrition and on Wellness for his encouraging co-operation. Thanks are due to Dr. R. C. Basu, Former Jt. Director, Zoological Survey of India, Dr. K. L. Ghosh, Director and Dr. S. Bhattacharyay, Assistant Director, Zoological Garden, Kolkata for providing necessary information about the Primates. Thanks are also due to Sri Subhendu Sen for printing of this publication timely in proper order.

T. M. Das

GREEN ECONOMY FOR DAILY USE CHANGING OF LIFE STYLE FOR BETTER LIVING

ABSTRACT

*M*an belongs to Primate Order. Raw fruits and vegetables are the basic natural diet for all 448 Primate species, man is no exception. Man during his 99.5% period of existence (Near two million years) lived on raw fruits and vegetables. Such food habit is genetically compatible to all 448 Primate species. It is their principal source for both food and medicine. Primate species, except human being, do not bear any compulsion of constant medication and hospitalization.

The current food habit of man is neither genetically compatible nor good enough for maintaining disease-resistant sound healthy life without medication. During cooking of food over boiling point of water (100°C) vitamin - C (which is also an anti-oxidant), vitamin B₆, vitamin B₁₂ are destroyed and most of the enzymes are denatured. Such food is anything but balanced one and makes the consumer prone to be attacked with various diseases. Consumption of commercially prepared fats and oils, unknown to other nonhuman Primate species and intake of several pollutants emitted by burning fuels inflict various chronic physiological disorders like cardiovascular troubles, lungs diseases etc; patients have to live on constant medication.

This booklet includes various kinds of balanced diets prepared from raw fruits and vegetables. It is advised that at least one meal per day should be taken with fresh fruits and vegetables and the other one to be cooked with solar energy or 'Electrically operated closed circuit smokeless oven'.

It is expected that such changing of life style would be helpful for elimination of fossil fuels and fuel wood in the kitchen. It would also be helpful to minimize the mounting pressure on grain production, e.g., rice, wheat, pulses etc. with corresponding reduction of fertilizers, pesticides, irrigation water, ground water and fossil fuels in agricultural fields.

This booklet includes the scheme of large-scale fruit trees plantation covering different States of the country along with methods of growing fruits and vegetables in the kitchen gardens and rooftop gardens.

Such changing of life style would be helpful for improving personal health and pecuniary condition of the people making a U-turn of the downward trend of the economic and environmental condition of the country as a whole.

T. M. Das Foundation for Development of Life Sciences

MISSION

Our mission is to find out practical ways and means to minimize consumption of fossil fuels, fuel woods and other hazardous energy sources along with maximization of using of solar energy and other non-conventional energy sources and intensive extension of greeneries with a view to restoring survival ratio for green plants to animals along with checking the rising average temperature of the earth's surface.

To find out an ideal lifestyle for mankind with due consideration of his genetic ability and inability which would be helpful for his survival through the Ages.

To disseminate essence of science, culture and scientific temper among the common people and the people who matter through using and developing Audio-Visual medium which would delete the barriers of language, age group and illiteracy.

ACHIEVEMENTS

Determination of the Value of Services of a Tree. *Indian Biologist*, Vol. **XI**(1-2), 1979 & Vol. **44**(1), 2012.

A scheme for generation of Electricity for Gravitational Pull. *Indian Biologist*, Vol. **48**(1), 2016.

Production of 4 improved Models of Solar Cooker without mirror. *Indian Biologist*, Vol. **45**(2), 2013. Production of 34 DVD/VCD's on various aspects of Life and Environment including Life under the microscope.

VCD No. 14 & 24 deserve special reference in which original observation of Plant Cell Division under living condition has been made using Interference Microscope and Time-Lapse Motion Picture technique. It reveals that during cell somatic division two sets of chromosomes never move to the opposite poles. Without m-RNA replica it is not possible for them to build up two daughter nuclei at the polar regions of the cell. The m-RNA replica is present at the middle of the cell with the material of dissolved mother nucleus. Hence,

the movie picture shows that the two daughter nuclei are developed in the middle of the cell. Just after separation of two sets of chromosomes cell plate is formed much earlier with help of cytoplasmic strand. Two sets of chromosomes gradually organise themselves into two daughter nuclei on either side of the cell plate almost touching the wall of the cell plate. Afterwards, they are placed to the central position of the daughter cells by the pulling action of the cytoplasmic strand.

But in the text book this error of basic concept of cell division has not yet been corrected. It should be rectified as soon as possible. *Indian Biologist*, Vol. **37**(2), 2005. *Audio Visual Gitanjali* by Rabindranath Tagore, Bengali & English Version (2010).

Gene Function : Genetically compatible diet and lifestyle for mankind. *Indian Biologist*, Vol. **46**(2), 2014.

A scheme for fruit tree and vegetable cultivation along with pisciculture on coastal region using marine water as an auxiliary source for irrigation and fertilizer. *Indian Biologist*, Vol. **46**(2), 2014.

Outline of schemes for generation of electricity and pure drinking water from nonconventional sources. *Indian Biologists*, Vol. **48**(1), 2016.

INTRODUCTION

What is Green Economy?

Green Economy represents an eco-friendly sustainable economic system achievable through maximization of using solar energy directly or indirectly along with using of other non-conventional energy sources. Extensive increase of green coverage on this planet coupled with minimization of the use of fossil fuels and fuel woods and other hazardous energy sources, simultaneously, checking of wastage and misuse of natural resources vis-a-vis controlling of population explosion, shall help in restoring a healthy relationship between demand and supply in a clean sustainable environment.

Background

As a contribution to the Rio+20 Conference, the United Nations Environment Management Group (EMG) has prepared a report on how the UN system could support countries in moving onto green economy pathways. The report is expected to facilitate a common understanding of green economy approaches and the measures required for the transition. Forty UN entities, including the Bretton Woods Institutions, contributed to the report, the key elements of which are illustrated here:

Shared understanding of green economy approaches

Sustainable development is a common yet evolving destination for humanity. It is where we, our children, and our children's children, find clean air and water, fresh and nutritious food, safe and weather resilient housing, efficient means of travel, rich biodiversity, healthy ecosystems, cultures and heritages, places for exercise, recreation, reflection and respite, stable and decent jobs, absence of poverty and equitable human relations.

Green economies are vehicles to drive us on a journey towards sustainable development. Poverty eradication is embedded in sustainable development. On this journey, green economy vehicles will pass many milestones such as :

Clean technology - Applying clean and green technologies can help meet energy needs and environment goals, as well as improve the carbon footprint in manufacturing, buildings, transport, waste management and recycling, and food production;

City halls - Creating effective civil institutions, such as city halls, are essential for ensuring good governance, providing services and social protection, and guiding policies on trade, regulations and pricing, among others;

Green banks - Restructuring public finance, leveraging private funds, and innovative financing mechanisms, including public and private partnerships, are key to implementing a green economy;

Global commons - Valuing ecosystems and natural assets, including forests, oceans and seas, freshwater lakes and rivers, soils and grasslands, farmlands, and urban green spaces, are also crucial for a green economy.

Inclusive communities - Ensuring human well-being, including opportunities for health, education, decent work, sustainable housing and engaged and inclusive communities, is key to a successful transition.

UN systems contributors : CBD, CEB, CITES, FAO, ECLAC, ESCAP, ESCWA, IAEA, ICAO, ILO, IMF, IMO, IPCC, ITC, ITU, Secretariat of the Basel Convention. The United Nations Relief and Works Agency for Palestine Refugees in the Near East, UNCCD, UNCTAD, UNDESA/DSD, UNDP, UNECA, UNECE, UNEP, UNESCO, UNFCCC, UNFPA, United Nations Global Compact, UN-HABITAT, UNICEF, UNIDO, UNITAR, United Nations Regional Commissions, UNWTO, World Bank Group, WFP. WHO, WIPO, WMO, WTO.

The Strategy for Survival of Life on an infinite Time Scale

The life is not new in this planet. It is about 3.5 billion years old as evident from the oldest oceanic fossil record. Life survived and flourished into many thousands species of plants and animals. Through ages by continuous trial and error a sound and sustainable strategy for survival of life on this planet has been evolved.

The whole animal world including human beings is totally dependent on green plants. The survival ratio of green plants to animals is

99 : 1 i.e., of the 100 parts of solar energy captured by the green plants only one part is available to the animal world. Green plants themselves consume 80 to 88 parts of energy and microbial organisms also consume a sizable portion of it. Thus ultimately only one part of solar energy reaches and utilized by the animal world. In order to survive one part of animals including human beings they require 99 parts (body weight) of green coverage in their surrounding environment. This survival ratio is the determining factor of the carrying capacity for mankind on this planet which is only one billion till 200 years ago.

History of human evolution refers earliest man (*Australo pithecus africanus*) evolved about 2 million years ago and the survival ratio was well maintained and their population was limited within the carrying capacity of this planet. Just within the span of last 200 years human population has suddenly been increasing by leaps and bounds grossly violating the survival ratio and the limit of carrying capacity. It happened mainly due to the discovery of Louis Pasteur on controlling infection by microorganisms the death rate, specially infant mortality was remarkably reduced but not the birth rate. We have been using science without having due scientific temper. And just within 200 years our population has increased to 6.7 billion and it is going to reach 10 billion within this century.

We were able to artificially raise the carrying capacity of the planet by exploiting the stored energy from fossil fuels. The Green Revolution that allowed us to increase crop yields by a factor of 7 was largely possible due to the application of chemical fertilizers, pesticides, heavy machines and irrigation with ground water, all derivatives of fossil fuels.

But the production of petroleum in most of the wells of the world after reaching a peak level has been steadily decreasing at an average rate of 3% per year with corresponding increase in its demand at an average rate of 2% per year. Hence the difference between the supply and demand has been increasing steadily year by year which is reflected in price hike of petroleum several times per year. This ever increasing gap between supply and demand creates dislodging effect on the economic system throughout the world including mechanized agriculture of our country.

Under such grave and critical situation what measures should be taken by the common people of our country? Through practising green

economy in our daily life we may lead a normal healthy life without burning fossil fuels or fuel woods in our kitchen. In sunny summer days solar cooker may be used for cooking and in rainy cloudy cold season we may get used to consume varieties of balanced food prepared from green fruits, vegetables and processed food material, full of vitamin B complex and vitamin C. These are complete and natural diets consumed by all other primates through millions of years. Such changing of food habit may help us to get rid of compulsion for using medicine and constant health care. At personal level such practising of green economy in our daily life would exert very small, almost negligible effect on checking the downward trend of country's economic condition but if it is practised by majority of people of our country it would produce a formidable impact making U-turn of our economic condition along with improving personal health and environment of our country. Riding on vehicles of green economy it seems possible to get out of the woods.

The Primates : Genetically compatible diets with reference to exceptional deviation in Mankind

Man belongs to the order primates, a group descended from ancestral mammals that lived on the ground within forests. Primates were evolved as early as 75 million years ago during the Paleocene epoch of Tertiary Period. From this early primate stalk five sublines (suborders) 16 families, 72 genera and 448 species are still surviving. Among these five suborders Hominoids was most advanced super family. Early man *Australopithecus africanus* was evolved from Hominids about two million years ago. It is interesting as well as equally significant to note that genetic speciality with regard to food habit of all species of five suborders of primates was more or less the same. They thrived on raw fruits and vegetables occasionally some species used to consume meats as well e.g. man. It was the basic natural diet which was well incorporated in their genetic and physiological systems.

Man during his 99.5% period of his existence was solely lived on his basic natural diet – raw fruits, vegetables and meats till the discovery of fire about 10 thousand years ago, when he started cooking at high temperature and gradually deviated from his basic natural food habit.

Cooking of food at high temperature with burning of fuels destroy vitamins C, B₆ and B₁₂ (Vide Table 4) denatures proteins and enzymes. Consumption of extra quantity of fats and oils from oil seeds and milk along with sugar and salt create various physiological disorders – like thickening of walls of blood vessels, obesity, diabetes etc. carbondioxide, carbonmonoxide, oxides of sulpher and nitrogen and suspended particulate matters emitted from the burning fuels pollute the environment and various hydrocarbons precipitate inside the alveoli of lungs of people, for which they require constant health care and medication. Such problems are significantly less among other species of primates who for long 75 million years without medication but strictly confined themselves with their genetically compatible food habit – raw fruits and vegetables.

Fruits are one of the integral parts of the life cycle of a plant. Fruits contain all the necessary nutrients e.g. carbohydrates, proteins, fats, vitamins, antioxidants, enzymes, minerals and hundreds of other organic compounds most of these with medicinal properties.

It is curious to note that plants do not consume the fruits they produce but use them for dispersal of seeds with the help of animals and other agents for maintaining and extending their territorial dominance.

Vitamin C and Natural Diet for Mankind

Vitamin C is of particular interest in terms of human nutrition because of the fact that human genes including that of all other primate species are unable to produce enzyme L-gulonolactone oxidase (GLO) to synthesize ascorbic acid - vitamin C in their body. Hence, it is compulsory for them to consume sufficient amount of raw fruits and vegetables to get vitamin C. They are true herbivores.

Contd.

Vitamin C is also an antioxidant controlling the excess of oxidation with preventing cell permeability and DNA damage along with preventing of a large number of physiological disorders. Vitamin C from raw fruits and vegetables is, therefore, an indispensable ingredient for a balanced diet of all primate species including mankind.

It is interesting to note that genes of carnivorous mammals are able to produce enzyme GLO and can synthesize their own vitamin C inside the body of the species. Tigers do not consume raw fruits and vegetables for vitamin C.

Vitamin C is a thermolabile compound; it breaks down at around 100°C. Same is the case of vitamin B₆ and B₁₂; they break down during cooking at high temperature. All proteins become denatured at high temperature. All enzymes are protein, hence, all enzymes (some of them are antioxidants) of raw fruits and vegetables during cooking process become denatured. Therefore, a cooked food at high temperature saturated with fats and oils, whatever may be quite tasty to our tongue, it may not be wholesome to our body and compatible to our genes. It seems to be the main reason why only individuals of human species have been suffering from so many diseases and health problems, while the rest of 447 species of nonhuman primates remain unaffected.

It is also quite apparent that like all other primate genes, human genes possess sufficient strength and ability for surviving through Ages without having any help from the Doctor, Medicine, Hospital and Meternity Home. For that purpose supply lines of gene regulated input potentials should be maintained properly and present life style of mankind should be thoroughly changed.

Contd.

Instead of cooking food we should adapt our natural food habit consisting of raw fruits and vegetables with which we did survive for 99.5% period of our existence.

But it is not easy task to convince the people about the utility and compulsion of such natural diet.

It would take a long time to reach the goal. But mean while who have already realised the truth they could consume raw fruits and vegetables with increasing amount with corresponding gradual reduction of cooked food, packaged food, tinned food etc.

An ideal mode of life style of mankind should be as simple and natural as possible with maintaining the gene regulated input potential avoiding deviation as far as possible.

See the article Gene function and genetically compatible diet and lifestyle for mankind. Page no. 47.

Nature of major problems developed with our present life style

1. We have been relying too much on fossil fuels and fuel woods net resources of which are rapidly reducing creating economic crisis all over the world. At the same time problems of pollution and global warming are becoming acute.
2. We have been spending almost unimaginable colossal amount of money on research and development of nuclear energy. If we could spend 10% of that amount on commercial use of solar energy including other non-conventional energy sources, the situation would have been quite different today.
3. Over 50% of natural resources are wasted when used in agriculture, industries and in our households. Crop plants utilise only 10% to 15% of fertilisers and rest of the amount is washed out and deposited in surrounding water bodies creating most hazardous utrofication problem.

4. We are lifting quite excess amount of ground water than its replenishment creating an unresolved serious problem in crop production, industrial growth and availability of arsenic free pure drinking water.
5. More than 30% of petroleum is wasted when used in transport and industries.
6. We have been misusing a colossal amount of natural resources worth over one thousand billion U.S. dollar per year on luxury consumer goods which are not absolutely necessary for leading a healthy normal life. Such consumerism also creates various social problems among large section of people who cannot afford it. Almost equal amount, as above, is misused in manufacturing largely excess quantity of weapons, warheads and military equipments. Only 25% of this amount per year could square up national debts of all the nations as well as resolve most of the environmental problems of the world permanently.
7. Contrary to the genetically compatible food habit of other primate species who thrive on raw fruits and vegetables, our food habit is neither genetically compatible nor good enough for maintaining sound health without any medication. During cooking of food at 100°C Vitamin C - an antioxidant, Vitamin B₆ and B₁₂ are completely destroyed; all enzymes and proteins are denatured. We have been consuming extra quantity of commercially prepared fats and oils, unknown to other primates along with adulterated ingradients at random. Carcinogenic hydrocarbons emitted from burning fuels have been precipitating in our lungs. All these together are causing various cardiovascular diseases, obesity, diabetes, kidney and liver problems, cancer etc. We are compelled to live on costly medication and constant health care. These problems are significantly less among other primate species, who nevertheless stick to their own genetically compatible food habit through long 50 million years till today.

Hence, it would be a quite right decision if we would take 'U-turn' and be accustomed with our basic natural diet consisting of raw fruits and vegetables; one such meal per day would serve the purpose. This subject is further elaborated in articles printed in page 31 & 45.

8. During the last 200 years the human population mostly in developing countries has been increasing following a stiff curve and steady exponential rate which is unprecedented and untenable on this planet. It may be identified as a primary problem. Other problems like food, water, health care, education, employment etc. are secondary ones. Unless and until this primary problem is solved, other problems are extremely difficult to solve permanently.

The main principle of Green Economy that can be practiced in our daily life are as follows :

1. Introduce commercial use of solar energy in all spheres of life.
2. Reduce use of fossil fuels and fuel woods as far as possible.
3. Popularise the use of solar cooker in village and urban sectors.
4. Know Your Gene (KYG). Raw fruits and vegetables are the genetically compatible food for all primate species including human being. Be accustomed to the use of variety of balanced diets prepared from fresh fruits and vegetables. Realise the real value of a tree and enrich the environment with green coverage in available pasture and fallow lands.
5. Grow your own fruits and vegetables in kitchen gardens and roof gardens.
6. Restore your natural healthy life by consuming less fats and oils and thrive more on fresh fruits and vegetables.
7. Population explosion is the primary problem of our country. Since the Independence a small section of well educated, practical minded and scientific tempered people irrespective of caste, creed and religion have been sincerely and successfully controlling their population, but vastly larger weaker sections of people are not. Such unequal growth dilutes the quality of population creating more problems. It is, therefore, apparent that spreading of proper education, specially women education among weaker sections within a shortest possible time is obligatory.
8. Wide spreading of scientific temper is equally obligatory among the people at large and people who matter. Otherwise, they would not be able to face the imminent, self-inflicted serious disaster developed from derailing of economy and environment.

Background of using low cost models of Solar Cookers in the country

Over half the world's population currently relies on wood, charcoal or other biomass for daily cooking, leading to respiratory diseases, economic hardship, environmental degradation, and carbon emissions. About 50% of Indian population, mostly villagers, use fuel-woods as the main source of energy for cooking purpose. They consume about 1 tonne of fuel woods per capita per annum. Thus over ½ Billion tonne of fuel wood is burnt per year producing large quantity of green house gases which causes reduction of green coverage used as carbon sink.

Weaker section of people, mostly in cities use kerosin, occasionally L.P.G for cooking purpose. Thus quite huge amount of fossil fuels increasingly consumed by them, creating both monetary and environmental problems. These problems may be resolved by using solar energy for cooking purposes which is totally free of cost, abundant in amount and free from pollution.

Description of following 4 models of improved low cost Solar Cooker as innovated for general use



Model No. 1

Model No. 2

Model No. 3

Figure - 1 : Model 1 for a family of 2 and a child, Model 2 for single person, Model 3 Portable solar cooker suitable for daily cooking

Model No. 1 : For a family of two persons and a child. The cooking chamber contains two large & two small containers.

Size : 20" x 20" x 7" (H), Weight : 10 kg

Model No. 2 : For a single person. The cooking chamber contains two large containers.

Size : 22" x 14" x 7½" (H), Weight : 7½ kg

Model No. 3 : Transportable Model. Suitable for daily worker who can carry it in the place of work. The cooking chamber contains one large container divided into three compartments.

Size : 13" x 13" x 6" (H), Weight : 5 kg



Model No. 4

Figure - 2 : Hanging type solar cooker with a large food container divided into 3 compartments

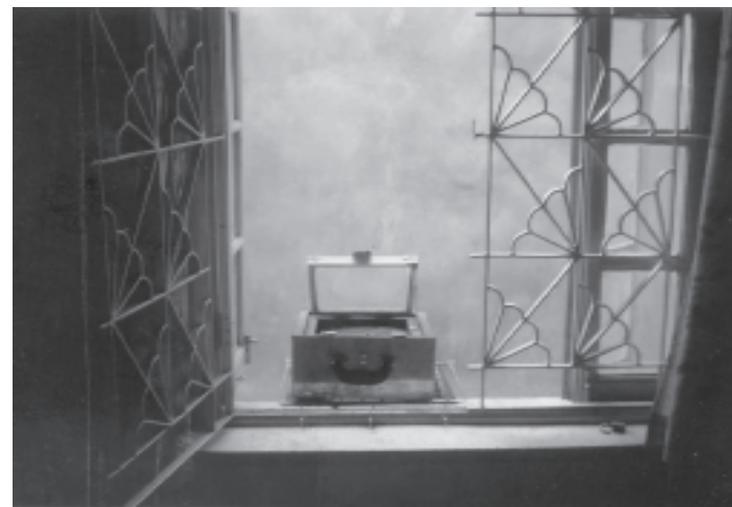
Model No. 4 : Hanging Type. Suitable for the people living in the hutments or multi storied buildings where roof surface is not available. The cooking chamber contains two large containers. This model also suitable for preparing tea, coffee and hot water.

Size : One feet height with one feet diameter of the top. Weight 4 kg.

All the Models can be used as window Models for multistoried building by placing them in position on a platform projected from the window where direct sunlight is available for atleast 2 hours.

Programme of using Solar Cooker

With the model no. 1 & 2 two meals per day can be cooked simultaneously. In the morning before going to work the solar cooker shall be placed on the open sunlight (for larger family two solar cookers can be used simultaneously). There is no need of constant attention. The meal will be properly cooked when the sun will come nearly to the zenith (11 am to 1 pm). And slowly heating the cooked materials upto 5'o clock, which helps softening dal, meat, fish etc. On returning from the work two meals for evening and next morning will be available to the user. If the glass cover of the instrument is not opened the meal inside the cooking chamber will remain warm upto 7 pm. In the morning it can be warmed with the morning sunlight.



Model No. 3

Figure - 3 : All the 4 models of Solar Cooker can be used as window models suitable for Multi-Storied Buildings

COOKING METHOD

Before cooking the glass cover and cooking chamber should remain thoroughly clean and dry. Mild detergent may be used for cleaning purpose, but never use brush during cleaning.

Put the raw food materials inside the food containers and close their lids properly and place them in position inside the cooking chamber. Close the glass cover and make the cooking chamber air tight with the

help of small clutches attached with the ream. During cooking the glass cover should never be opened. Place the solar cooker in open sunlight.

There is no need for keeping constant attention during cooking. The sunlight entering inside the cooking chamber will be converted into infrareds (heat reds) and temperature will rise upto 120°C when the sun will come near to the zenith. The heat that generated inside the cooking chamber cannot escape readily through the insulated chamber and cooking process slowly continued as long as it gets the sunlight. At 5 p.m. after returning from work one can be provided with readymade food for evening and next morning meal, hot tea or coffee on hot water if the glass cover is not opened the food inside food containers remain warm for 2 to 3 hours.

For the next morning meal the food material can be warmed by keeping the lid of the cooker in position about 45° angle while the morning sunlight reflecting on its surface will warm up the food materials.

VARIOUS FOOD RECIPIES FOR SOLAR COOKING

1. Rice cooking :

Unboiled rice, Gobindabhog (গোবিন্দভোগ) variety etc. would be the most suitable for solar cooking. For boiled rice variety it should be soaked under water for 1 hour before cooking. Ratio of rice & water 1 : 3.

2. Cooking of Pulses :

All kinds of pulses (মুগ, অড়হর, ছোলা ইত্যাদি) except mung (মুগ ডাল) should be soaked under water over night before cooking. Mung can be used directly without soaking. Ratio of Pulses & Water 1 : 4.

3. Cooking of Khicuri (খিচুড়ি) :

Cooking of khicuri in solar cooker is very easy. Use equal amount of rice preferably Gobindabhog variety and mung dal, add requisite amount of salt, masallas, sugar etc. and 3 times of water as compared to mixture of rice and dal in the food container.

4. Ghugni of green pea (কড়াইশুঁটির ঘুগনি) :

In the same process above the Ghugni of green pea can be cooked. In this case only very small amount of water shall be added.

5. Boiling of Egg (ডিম সিদ্ধ) :

Boiling of egg can be done very nicely by placing the egg without any water at any corner of the cooking chamber.

6. Cooking of Fish (মাছ রন্ধন) :

Vhapa Hilsha or Katla (ভাপা ইলিশ/ভাপা কাতলা). Vhapa hilsha or katla can be made nicely by the solar cooker after mixing with requisite masallas and marinate them with yogurt and vinegar preferably over night.

7. Cooking of Meat (মাংস রন্ধন) :

Meat, Boneless chicken or Chicken and liver of Mutton or Chicken can be cooked through above mentioned process. In this case marination with Yoguurt and Vinegar is required over night.

8. Chatni (চাটনি) :

Chatni of various vegetables e.g., Tomato, Pineapple, Olive (জলপাই), Chalta (চালতা), Kamranga (কামরাঙা) etc. can be done nicely by adding requisite amount of masallas and tamarind with small amount of water.

Preparation of varieties of balanced diets from raw green fruits and vegetables and processed food materials for rainy and cloudy days

What is Balanced Diet?

The diet which contains carbohydrate, protein, fat, vitamins, minerals and water in right proportion and amount fulfilling the calorie need of a person to maintain a healthy normal life is called balanced diet.

Table 1 and 2 shall be used to prepare varieties of balanced diet from raw green fruits, vegetables and processed food materials.

Table 1. Routine of daily consumption of food

Food rich with carbohydrate daily 300 g.	Food rich with protein daily 250 g.	Fresh fruits & vegetables daily 200 g.
Breakfast 50 g. Lunch 150 g Dinner 100 g.	Breakfast 50 g. Lunch 100 g. Dinner 100 g.	Breakfast 100 g. Lunch 50 g. Dinner 50 g.

In the Table 1 the relative amount of these three food categories of raw food materials for breakfast, lunch and dinner have been shown.

Table 2. List of raw food items for the preparation of balanced diet in rainy and cloudy days (vide Tables 5, 6, 7 for Food Values)

Carbohydrate Rich Food	Protein Rich Food	A list of food items containing carbohydrate, protein, vitamins, enzymes & minerals
Chira (flattened rice চিড়া) Muri (puffed rice মুড়ি), Khai (parched rice খই) Murki (মুড়কি) Batasa (বাতাসা), Moya (মোয়া), Molasses, Patali (পাটালি), Sugar Candy, Honey, Bread, Chocolate, Donut, Cake, Biscuit, Potatochips, Cornflex and Sweets etc.	Milk, Soyabin, Curd, Chana (posset ছানা), Cheese, Chatu (ছাতু), Chick-pea (ছোলা, কাবলি ছোলা), Sprouted Chick-pea, Bean, Pigeon pea, Green pea etc.	Tomato, Lettuce, Cucumber, Onion, Radish, Ginger, Garlic, Coriander leaves, Beet, carrot, Capsicum, Lemon, Orange, Pummelo (বাতাবি লেবু) Green coconut, Coconut, Pine-apple, Banana, Guava, Mango, Papaw, Jack fruit, Jamurd, Litchi, Sabeda, Kamranga, Amalaki, Melon, Musk-melon, Custard apple (আতা), Grape, Pomegranate (বেদানা), Pear (ন্যাসপাতি) etc. Dry Fruits - Different species of nuts, cashew, Raisin (কিশমিস), Pista etc

In Table 2 a separate list of raw food items rich with fats and oils is not given. The amount of fats and oils present in milk, milk products, dry fruits and other green fruits and vegetables are sufficient for preparation of balanced diets. The milk is a complete food. One should drink a cup of milk per day.

In the Table 2 a large number of raw food items have been classified into carbohydrate, protein, vitamin and mineral rich food items.

According to users' taste and food budget food items to be selected from each category.

This diet is meant for average adult male with moderate working habit. But daily calorie need varies with age, sex and working habit of a person.

Table 3 shows the details of daily calorie needs of persons of different ages, sex and working habit. Hence the amount of each category of food item shall be increased 25% for a person with heavy working habit. 5% to 10% less for sedentary person, 5% to 10% less for a female and 10% to 15% less for a child less than 8 years.

Table 3. Recommended daily calorie intake

Age	Male Activity level		Females Activity level	
	Sedentary	Moderate	Sedentary	Moderate
4-5	1200	1400	1200	1400
8	1400	1600	1400	1600
10	1600	1800	1400	1800
12	1800	2200	1600	2000
15	2200	2600	1800	2000
16-18	2400	2800	1800	2000
21-25	2400	2800	2000	2200
26-40	2400	2600	1800	2000
41-45	2200	2600	1800	2000
46-50	2200	2400	1800	2000
51-60	2200	2400	1600	1800
61-65	2000	2400	1600	1800
66 and up	2000	2200	1600	1800

Table 4. Vitamin losses at high temperature (100°C) and other factors susceptible to vitamin losses under given condition

Nutritional Element	Exposure to Heat	Is substance susceptible to losses under given condition
Vitamin - A	Relatively stable	
Vitamin - D	No	
Vitamin - E	No	Contact with iron and copper
Vitamin - K	No	Loss with strong acid or alkaline solution
Thiamin	>100°C	Loss with alkaline solution
Riboflavin	No	Long cooking in large volume of water
Niacine	No	Strong acid solution + alkaline solution (oxidizing in solution)
Biotin	Yes	Strong acid solution and alkaline solution-oxidising substances
Pantothenic Acid	Yes	
Folate		?
Vitamin B-6	Yes	
Vitamin B-12	Yes	Strong acid and alkaline solution. Also in contact with iron and copper
Vitamin - C	Yes	

Table 4 bears an important information. It indicates that vitamin C and most of the vitamins of vitamin B complex are lost at high temperatures (over 100°C). So it is apparent that people who solely depend upon cooked food are bound to suffer from malnutrition due to vitamin deficiency and prone to attack with various physiological disorders.

**Normal Diets of Primates in Zoos
with reference to occurrence of cronic diseases e.g.,
diabetes, obesity, cardiovascular diseeseas, lungs
diseases, kidney troubles, etc. and regular
medication and hospitalization**

Above mentioned information are being collected from famous zoos round the world. The Report received from the Director, Zoological Garden, Alipore, Kolkata - 700 027 is as follows :

Primate Species	Daily Feed
Bonnet Monkey	Sweet Fruits – 150 g, Bread - 75 g, Banana - 200 g, Red Potato - 125 g, Carrot - 125 g
Assamese Monkey	Sweet Fruits - 150 g, Bread - 75 g, Banana - 200 g, Red Potato - 125 g, Carrot - 125 g
Baboons	Sweet Fruits - 275 g, Bread - 150 g, Bean - 100 g, Banana - 300 g, Red Potato - 200 g, Carrot - 200 g
Cormon Marmoset	Lactogen - 5 g, Glucose Powder - 2 g, Banana One, Apple - 10 g, Cucumber - 5 g, Orange - 5 g, Gram - 10 g, Bread 25 g, Boiled Egg ½ piece given twice in a week
Common Langur	Sweet Fruits - 150 g, Bread - 100 g, Banana - 200 g, Red Potato - 200 g, Carrot - 200 g.

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Chimpanzee	Daily Feed			
	Food Item	Morning	Afternoon	
Complan	4 tea spoonful with 500 ml of milk & 2 tea spoonful of sugar			
Cabbage (Seasonal feed)	500 g.	Bread	200 g.	100 g.
Bean (Seasonal)	250 g.	Orange	Two	Two
Lettuce (Seasonal)	Six	Apple	One	One
Tomato (Seasonal)	60 g.	Grape	50 g.	50 g.
Mango (Seasonal) Water-melon (Seasonal)		Banana	Seven	Seven
		Dates	50 g.	50 g.
		Red Potato	200 g.	200 g.
		Carrot	200 g.	200 g.
		Cucumber	200 g.	200 g.
		Onion	25 g.	25 g.
		Papaya	100 g.	100 g.

Periodically vitamins and minerals are provided with the regular diets to the aforesaid primates of this zoo.

It is important to note that above mentioned meals are served only once daily except in Chimpanzees – Morning meal and Afternoon meal are served to them.

Regular medication for blood pressure, blood sugar, obesity and cardiovascular diseases like human being is not needed for the primates. In recent past, no primates of this zoo died due to such said diseases.

Electrically operated Closed-Circuit Smokeless Oven

From Kolkata Doordarshan Channel on April 13, 2013 at 5-30 p.m. the topic of Green Economy for daily use along with the use of Solar Cookers was telecast. Many queries are coming from various corners. Many housewives eager to know how they would serve several cups of hot tea at midnight or early in the morning. Our answer is :
1. Use thermoflask in which the tea prepared in nozzleless kettle in solar cooker remains warm for several hours. 2. Use electrically operated closed circuit smokeless oven (Fig. 4), in which 6 cups of tea can be prepared in nozzleless kettle within 5 to 8 minutes. In absence of electricity use paper pulp balls as fuel.



Fig. 4. (From left) Electrically operated closed circuit smokeless oven. Nozzleless kettle contains 6 cups of tea. Food container arranged vertically in this oven. Oven containing paper pulp balls. In front paper pulp balls in the plastic dice (use for carrying eggs)

The closed circuit oven was first innovated by Dr. Indumadhab Mallick (1869-1917) in 1910 and named it as 'IC-mik Cooker'. Dr. Mallick was not only a renowned physician but also received Master Degrees in Botany, Zoology and Philosophy.

In the closed circuit cooker food containers were arranged vertically within a metallic cylinder and charcoal was used as fuel. Very small amount of fats and oils were used and food was prepared with slow heating and very small amount of smoke was released. This cooker

was quite hygienic and easy for using. But due to lack of proper publicity it did not receive deserved popularity.

We have modified the 'IC-mik Cooker' by fitting with a removable electrical heating coil and fixing plastic tube containing, Barium Hydroxide through which smoke would be released. This chemical would absorb CO_2 and reduce air pollution.

In villages where electricity is not available, we have innovated paper pulp balls as fuel. This paper pulp balls have been prepared by using small pieces of waste paper or newspaper soaked in water over night and then grinding with mortar and pastel or small mixture grinder machine and make them round shape with casting in plastic dice (using for carrying eggs) Fig. 4. The excess water in the mixture should be discarded squeezing it through nylon net before putting it into dice. These paper pulp balls after thorough drying can be used as fuel by adding a few drops of kerosene. Generally one ball is sufficient for preparation of one cup of tea. This paper pulp balls can be manufactured as a cottage industrial product in villages.

With using a Solar Cooker and a Closed Circuit Smokeless Oven it is quite feasible for total elimination of gas, kerosene, coal and fuel woods in the cooking processes and thereby solving a part of major problem of our country.

It would be, however, more prudent if we could replace the cooked foods with our basic natural diet of fresh raw fruits and vegetables (See Tables : 1, 2, 5, 6, 7 & 8).

Grow your own fruits and vegetables in kitchen gardens and roof gardens

Prices of the fruits and vegetables have been escalating beyond the reach of common people. It is quite feasible to grow your own vegetables like tomato, brinjal, ladies finger, broccoli, carrot, beet, chilli, lettuce, spinach (*Palangsak*) amaranths (*Notesak*), pea, gram, onion, garlic, pumpkin, cucumber, bottle-gourd, bitter-gourd (*Utchhe*), coriander leaves, capsicum etc. in roof gardens. These plants can be grown successfully in 10" or 12" diameter pots with loose sandy lone soils and with little leaf manure or oil cake manure or cow dung manure and regular watering.



Fig. 5. Brinjal in Pot culture



Fig. 6. Lemon in Pot culture

Photo by courtesy : Dr. A. K. Lahiri

These pots can be arranged in rows on tiles raised 3" above the roof surface by placing the bricks under the tiles. It is to be noted that load bearing capacity of a concrete roof (4" thick) is approximately 60 kg per sq. ft. (Life load) which is more than sufficient to carry a large pot with soil and plant. In the case of large number of pots or smaller space of the roof wooden or iron or concrete gallery can be constructed on which pots may be arranged in rows. Regular watering of plants should be made in morning or afternoon hours avoiding hot noon hours. Proper drainage of water should be maintained avoiding its accumulation on the roof surface.

Seeds of plants should be purchased from reputed farms. Before planting seeds should be soaked in water for 2 to 6 hours, then germinating in small pots containing moist soil, only best germinated seedlings from the lot should be transplanted in pots @ 3 to 4 seedlings per pot. After one week only one seedling should be grown per pot discarding the others. However, in the case of pea, gram, spinach, lettuce, carrot, beet, onion, garlic, amaranths, coriander leaves etc. multiple seedlings should be grown per pot.

In the case of creepers like pea, pumpkin, cucumber etc. a strong support is required (mancha) which may be provided above the pot for spreading their branches freely. In case of insect attack mild pesticide may be applied.

In the kitchen gardens above mentioned vegetables may be grown with same type of soil, manure and regular watering during morning or afternoon hours avoiding hot noon hours. Seeds should be first germinated in a small pot, then transplanted to the field. During plantation maintaining proper spacing between two plants and between two rows is an important factor.

Fruit trees like papaya, banana, guava, lemon, pummelo, coconut mango, jack fruit can be planted. Fruit trees do not require regular watering and manuring. In this case the most important factor is the selection and collection of true variety of saplings from a reputed source, otherwise the main purpose would be jeopardised.

Table 5. Food values of raw vegetables roots and tubersValues are given in g or mg or μg per 100 g of food

	Energy KCal	Carbohydrate g	Protein g	Fat g	Vitamin A μg	Vitamin B Camp	Vitamin C mg	Mineral g	Calcium mg
Tomato	20	3.6	0.9	0.2	351	+	-	0.5	48
Lettuce	21	2.5	2.1	0.3	990	+	10	1.2	667
Beet	43	8.8	1.7	0.1	0	++	10	0.8	18.3
Carrot	48	10.6	0.9	0.2	1890	++	3	1.1	80
Garlic	145	29.8	6.3	5.8	0	+	13	1.0	30
Ginger	67	12.3	2.3	0.1	40	+	6	1.2	20
B Gram Chick pea	360	60.9	17.1	5.3	189	++	3	++	++
Green Mung	334	56.7	24	1.3	94	++	-	3.5	124
Sayabean	472	20.9	43.2	19.5	426	++	-	4.6	240
Pea Green	93	15.9	7.2	0.1	83	+	9	0.8	20
Red Gram	335	57.6	22.3	1.7	132	+	-	3.5	73
Spr Cow pea	323	54.5	24.1	1.0	12	++	3	3.2	77
Brussels Spr	52	7.1	4.7	0.5	126	++	72	1.0	43
Cabbage	27	4.6	1.3	0.1	120	++	124	0.6	39
Coconut	444	13	4.5	41.6	-	++	-	1.0	10

☞ In this context it should be noted that in the market most of the green vegetables are soaked with toxic chemical like copper sulphate (কুঁতে) solution to retain their green colour for a longer period. Copper replaces magnesium of the chlorophyll molecule retaining green colour of the vegetable for a much longer period. But copper sulphate is extremely toxic to human health, it damages kidneys, liver. This factor can be eliminated if we grow our vegetables in gardens. In the market copper sulphate treated vegetables could be identified by observing their abnormally deep green colour particularly of their petiole-tip (বেঁটা) through which copper sulphate solution is absorbed.

Table 6. Food values of various fruitsValues are given in g or mg or μg per 100 g of fruits

	Energy KCal	Carbohydrate g	Protein g	Fat g	Vitamin A μg	Vitamin B Camp	Vitamin C mg	Mineral g	Calcium mg
Banana	116	27.2	1.2	0.3	78	+	7	0.8	17
Apple	59	13.4	0.2	0.5	-	-	-	0.3	10
Orange	48	10.9	0.7	0.2	1104	-	30	0.3	26
Lemon	57	11.1	0.7	0.3	-	+	39	0.3	70
Lime Sweet	43	7.3	0.8	0.3	-	-	50	0.7	30
Pummelo lemon	44	10.2	0.6	0.1	120	+	20	0.5	30
Guava	51	11.2	0.9	0.3	++	+	212	0.7	10
Ripe Mango	74	16.9	0.6	0.4	2743	+	16	0.4	14
Papaya	32	7.2	0.6	0.1	666	+	57	0.5	17
Sabeta/Chicoo	98	21.4	0.7	1.1	97	+	6	0.5	28
Water Melon	17	3.3	0.2	0.2	0	+		0.3	11
Custard Apple	104	23.5	1.6	0.4	0	+	37	0.9	17
Amla	58	58	0.5	0.1	9	+	600	0.5	20
Peers	52	11.9	0.6	0.2				0.3	8
Radish Leaf	28	2.4	3.8	0.4	5295	+	81	1.6	265
Strawberry	44	9.8	0.7	0.2	18	+	52	0.4	30
Grapes Black	58	13.1	0.6	0.4	3	+	1	0.9	20
Green Mango	44	10.1	0.7	0.1	90	+	-	0.4	10
Lichi	61	13.6	1.1	0.2	0	+	31	0.5	35
Blueberry	62	14.0	0.7	0.3	48	+	18	0.4	15
Green Papaya	27	5.7	0.7		0	+	7	0.2	28
Pineapple	46	10.8	0.4	0.1				0.4	20
Jack fruit	88	5.9	1.9	0.1	175	+	7	0.9	20
Cucumber	13	2.5	0.4	0.1	0	+	7	0.3	10
Turnip Greens	67	9.4	4.0	1.5	9396	++	180	2.2	710
Pomegranate	65	14.5	1.6	0.1	0	+	16	0.7	10
Musk Melon	17	3.5	0.3	0.2	169	+	26	0.4	32
Kochu Shaak Black	77	8.1	6.8	1.5	12000	+	63	2.5	460

Table 7. Food values of milk, milk products, processed foods and dry foods
Values are given in g or mg or μg per 100 g of food

	Energy KCal	Carbohydrate g	Protein g	Fat g	Vitamin A μg	Vitamin B Comp	Vitamin C mg	Mineral g	Calcium mg
Cow milk	67	4.4	3.2	4.1	53	+	1	0.8	120
Buffalo Milk	47	5.0	4.3	6.5	48	+	1	0.8	210
Yogurt	60	3.0	3.1	4.0		+	1	0.8	149
Curd	265	1.2	18.3	20.8	110	++	3	2.6	208
Cheese	348	6.3	24.1	25.1	82	-	-	4.2	790
Butter	729	-	-	81.0	960	-	-	2.5	-
Puffed Rice	325	73.6	7.5	0.1	-	++	-	3.8	23
Rice Flake	346	77.3	6.6	1.2		++	-	3.0	20
Jaggery	383	95.0	0.4	0.1	-	-	-	0.6	80
Peanut	567	26.1	25.3	40.1	37	+++	-	2.4	90
Cashew	596	22.3	21.2	46.9	60	++	-	2.4	50
Almond	655	10.5	20.8	58.9	0	++	-	2.9	230
Walnut	687	11.0	15.6	64.5	6	++		1.8	100
Date	144	33.8	1.2	0.4				1.7	22
Figs	37	7.6	1.3	0.2	162	+	5	0.6	20
Pischaio	626	16.2	19.8	53.5	144	++	-	2.8	140
Kismis	308	74.6	1.8	0.3	2.4	+	1	2.0	87
Apricot Dry	306	73.4	1.6	2.8	2160	++			
Sesame Seeds	563	25.0	18.3	49.3	60	++	-	5.2	1450

Source : Nutrition value of Indian foods by Gopalan, Ramshastri, Balasubramian
Published by National Institute of Nutrition and ICMR

Two news of practical application of 'Green Economy for Daily use' with outstanding Result

September 5, 2013. A news of great significance was telecast from a news channel all over the country. An Australian couple has been enjoying a sound healthy life for the last 15 years eating only raw fruits and vegetables. They defy the compulsion of medication and hospitalization.

They were physically so much fit that they have been running on foot from city to city carrying the message to the people : 'Be used to live on raw fruits and vegetables and enjoy healthy tension free life.' They are planning to cover all the mega cities round the coastal line of the Continent.

Viswa Barta

Aakash, September 5, 2013

In Beijing, China Rooftop Gardening has now been gaining popularity because of multiple reasons. All sorts of green vegetables and flowers are cultivated on the top of roofs of large commercial buildings and private houses. These gardens are not only helping production of green vegetables and flowers but also reduce air pollution by absorbing carbondioxide released from 25 lac motor vehicles running on the streets.

Association of Roof Top Gardens, Beijing, claims that already total area of 13 lac sq. meter rooftop has been converted into gardens. They are expecting to increase the total area by 10% per year. Govt. of China also supports the movement for 3 reasons.

1) It increases the production of fruits and flowers. 2) It increases the green coverage in the heart of the capital city acting as a carbon sink. 3) These gardens become favourite tourist spots because of their novelty and proximity, some of them are situated next door to Travel Agencies.

Aakash, News Channel

September 12, 2013

**ROAD-SIDE FRUIT TREE PLANTING :
PLENTY OF BENEFITS
BIJOY KUMAR CHANDRA**

INTRODUCTION

Fruits are the basic natural food for all primate species including human beings.

Fruits contain all the essential components of balanced diet e.g., carbohydrate, protein, fats and oils, vitamins and mineral including antioxidant – enzymes and water.

During the geologic era of Tertiary period a large number of primate species were flourished along with various fruit bearing tree species. Fresh fruits and meats were the basic natural diet for the primates.

Early human species (*Australopithecus africanus*) evolved about 2 million years ago and adapted with basic diet of various fruits and fresh meats till the discovery of fire about 10 thousand years ago when they started cooking foods. More than last five million years till today all other primates except human beings stick to their basic natural diet.

It is interesting to note that occurrence of cardio vascular diseases, lung diseases, kidney troubles, pressure, cancer and sugar problems are significantly less among other primates as compared to human beings; other primate species do not require constant medication, health care and hospitalization.

During cooking of food vitamin C and vitamin B-6 and B-12 are completely destroyed at 100°C. Hydrocarbons released from the burning fuels are deposited in the lungs of the people and make an ideal precondition for attacking with various diseases.

Cultivation of fruit trees in larger scale and increased consumption of various fruits would be helpful to rectify our food habits.

Trees not only supply our ideal natural food but also render various valuable services to our society and environment (Das 1979, 1980, 2012).

Fruit tree planting

Fruit trees have long life and can offer vast green canopy. Little grown-up fruit trees of 2 to 3 years' age are to be planted. Prior to

this, preparation of fruit tree saplings are to be done in nearby nurseries. Little grown-up fruit trees of the above age suited to the local environment are to be planted @ 400 trees per km on the second row of the National Highway, State Highways and on District & rural roads on both sides. It is pertinent to mention that for planting of fruit trees no new land is required to be acquired. The NGOs engaged in various ecological and environmental upliftment plans and programmes have a vital role to play. They will supply the fruit-tree saplings.

Employment Opportunities

Self-employment opportunities for local inhabitants will be created by engaging them at planting, caring and protection of these fruit trees allotted to them specifically area-wise, say, 1km per group of 4 persons or so. Their some payments may be made by implementing the 'National Rural Employment Guarantee Scheme' (i.e. 100 days' work scheme). Owners and workers of local nurseries will also be benefited for preparing saplings and supplying fruit trees of 2-3 years of age. The local inhabitants, looking after the trees, will be permitted to sell the fruits of these trees. They will not be permitted to own or sell those trees. Neither they will be permitted to have the right of the land so used. Ownership of the trees shall lie with the government.

Environmental Problem : Reduction

Thus, these fruit trees, so planted, will offer reduction of the problem of oxygen deficiency in the environment. Erosion of land of the roads will also be arrested. Leaves falling off the trees will be used as manure to boost fertility of the soil. Further, birds getting shelter on the trees will eat up harmful insects and thus save use of pesticides. Other benefits have been shown earlier under 'Value of benefits of a tree'.

Experience in Germany

It is worth mentioning that the arrangement of fruit-tree coverage has long been implemented successfully throughout Germany. It is a common sight there that these fruit trees yield such plenty of fruits as beyond total human consumption and as such plenty of these fruits are dropped and wasted as excess. Though late, this green coverage of roads by planting of fruit trees should be implemented in our country right now.

Indian Roads

Surface Road - 948640 km + 597042 km = 1545682 km

Unsurface Road - 675675 km + 477266 km = 1152941 km

Total = 2698623 km

(Roads under Zila Parishad, Panchayet Samities and Gram Panchayets are not taken into account, if taken, it would be much more).

(Source : Statistical Pocket Book of Central Statistical Organisation, Ministry of Statistics & Programme Implementation, Government of India, New Delhi. 2008 (Page 138-139))

Out of 2698623 km roads, say, 25% roads passing through cities, towns and forests not suitable for planting.

2698623 km – 25% = 2023967km

If planted on the second line 200 trees on each side of the road then 1 km i.e 400 trees per km may be planted.

say, 20,000,00 km x 400 Trees per km.

= 80,000,0000 Trees may be planted

say, 5000 Trees to be nourished per each nursery per year.

80,000,0000 Trees ÷ 5000 trees per nursery

= 160,000 nurseries may be benefited

800000000 Trees @ 10 kg fruits per tree

= 80,000,00000 kg fruits ÷ 1,000

(1,000kg = 1 ton) = 80,00000 tons Fruits per year may be grown. We can assume that average 10kg of fruits may be available from each tree.

Yearly Employment generation

For every kilometer having 400 trees, on both sides of the road, about 4 persons will be required to nourish the trees and to protect, guard and keeping the fruits and trees intact. When the fruits will be ripe and ready for marketing, some more persons will be required. Say, 1 person for 2 km required i.e. 20,00000 km ÷ 2 =10,00000 persons for marketing may get self-employment.

It is often experienced that generally local people pluck fruits off the fruit-trees at random and some even destroy the trees. If the same people are entrusted with the task of caring and protecting the fruit-trees, they will do so in right earnest because they will be allowed to enjoy the fruits of these trees and thereby earning a lump sum. Thus, local people may be engaged as area-wise self-employed caretakers for planting, caring and protecting the fruit trees. Their

payments, partly, may be made by implementing the 'National Rural Employment Guarantee Scheme'(100 days' work scheme). They will not be permitted to own or sell those trees. Neither they will be permitted to have the right of the land so used. Ownership of the trees shall lie with the government. The caretaker will enjoy the fruits of the trees.

Utilization of unused land

1 hectare = 10,000 sq.m

For 1 fruit tree approx. 25 sq.m land is required.

So, 10,000 sq.m ÷ 25 = 400 fruit trees per hectare of land.

80 crores trees ÷ 400 (per hectare) = 20 lakh hectare of unused land will be covered/utilised.

1 sq.km =100 hectares.

20 lakh hectare ÷ 100 (100 hectares = 1 sq.km) = 20,000 sq.km

20,000 sq.km unused land will be utilized by fruit-tree plantation.

For implementing this massive plan of fruit-tree plantation needing 20 lakh hectares of land, no new land requires to be acquired. Only road-side land will be utilised.

Benefits

1. Self-employment for upkeepment	80,00,000 persons (20 Lakh km x 4 persons per km)
2. For Marketing	10,00,000 persons (20,00,000 km of road ÷ 2 persons per km = 10,00,0000 persons)
3. For Nursery (1,60,000* nurseries x 4 persons)	6,40,000 persons
Total	96,40,000 persons

*(20,00,000 km road x 400 trees per km = 80 crores trees
80 crores trees ÷ 5000 trees per nursery = 1,60,000 nurseries)

4. Production of Fruits 80, 00,000 tons

20,00,000 km x 400 trees per km comes to 80,00,00000 trees

10 kg of fruits per tree = 800 crores kg ÷ 1000* = Production of 80 lakh ton fruits per year.

* 1 ton =1000 kg.

Thus, the above Plan of planting fruit-trees by the side of all Surface and Unsurface roads of the country, if implemented, self-employment for 96,40,000 rural people can be generated and guaranteed without incurring much expenditure on the part of Government.

This PLAN ensures to sum up, the following Benefits :

1. Self-employment generation of 96,40,000 rural people.
2. Green coverage on all Surface and Unsurface roads utilizing 20,000 sq.km unused road-side land.
3. Remedy for environmental air pollution.
4. Prevention of erosion of roads.
5. Production of 80,000,00 tons fruits per year.
6. Production of huge quantity of oxygen.
7. No new land to be acquired.
8. Rs. 5000 crore foreign exchange can be earned yearly by export of fruits.

Earning of Foreign Exchange

Out of 80 lakh tons of fruits grown per year if 10 lakh tons of fruits can be exported then Rupees five thousand crores (5000,0000000) foreign exchange can be earned :

Say, Rs. 50/- per kg fruits.

Rs. 50 x 1000 kg fruits = Rs. 50,000 per ton fruits.

10,00000 ton x 50,000 = Rs. 5000,0000000/- foreign exchange per year.

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REVALUATION OF SERVICES OF A TREE (2012)

T. M. DAS

The value of a tree was published by the present author in 1979 in the *Indian Biologist*, in Vol. XI, No. 1-2, pp 73-79. For the first time, the intrinsic value of a tree was determined on the basis of various environmental benefits and services derived from a tree during its life span of 50 years and its amount was Rs. 15,70,000 calculated at the market rate that prevailed in 1979.

When we estimate the conventional value of a tree we only count the total weight and quality of timber or fruit or biomass it produced and that could be sold in the market.

It was noted in the aforesaid 1979 calculation that all these together hardly make about 0.3% of the real value of a tree. Other benefits that are being derived from the tree in our society are totally overlooked. If we count these items at the prevailing market price in 2012 the value of a tree would be increased more than 20 times.

In 1981 the value of a tree was elaborately presented in the Presidential Address delivered by the present author in the Agricultural Sciences Section in the 68th Session of the Indian Science Congress at Varanasi. It received worldwide attention and the summary of the paper was reprinted and cited in reference books of related subjects including books on accountancy, and journals published by the United Nations Organisation. In those papers Indian Currency was converted in Dollar, Pound and Yen etc. and gave wide publicity through posting permanent exhibitions in forests Reserves, Botanical Gardens, Zoological Gardens, Museums (Fig. 1) of most of the countries.

In the field of accountancy a special branch of Social Accountancy and Corporate Social Reporting got incentives from this calculation for determining of social value of natural resources (Chattopadhyay 2000).

In 1983, the Film Division of the Govt. of India made a documentary film entitled 'Services of a Tree' which was widely acclaimed and received the First Prize in the International Documentary Film Competition in Spain. In the body of the original paper it was apprehended that the estimated value would not be a constant figure, it may increase with increasing price of oxygen, cost of energy and other inputs in 1991, Australian Horticulturalist Nancy Beckham published a comprehensive review on the subject in the *Indian Biologist* (1992).

Over three decades subject matter specialists of various disciplines such as Botany (Plant Physiology), Zoology, Environmental Sciences and amateur environmental activists have been increasingly urging for updating for the valuation of a tree. Accordingly, all the calculations of the original papers have been revised as per current market rate (accepting the minimal level/rate of 2012 prices).

**The Value of A Tree
From Singapore Zoo**

**According to Professor T. M. Das
of the University of Calcutta :**

A tree living for 50 years will generate \$31,250 worth of oxygen,
provide \$62,000 worth of air pollution control,
control soil erosion and increase soil fertility to the tune of \$31,250,
recycle \$37,500 worth of water and provide a
home for animals worth \$31,250.

A total value of \$196,250.

This figure does not include the value of the fruits, lumber or beauty derived
from trees. Just another sensible reason to take care of our trees.

Fig. 1. From Perth Museum : Australia

Table 1. The Revaluation of environmental and social benefits derived from a tree during 50 years of growth

During 50 years of growth	Original (1979)	Revised (2011-12)
1. Production of oxygen	Rs. 2,50,000	Rs. 5,25,000 (\$ 10500)
2. Conversion to animal flesh & bones	Rs. 20,000	Rs. 1,50,000 (\$ 3000)
3. Controlling of soil erosion & soil fertility	Rs. 2,50,000	Rs. 5,00,000 (\$ 10000)
4. Recycling of water and controlling humidity and Air temperature	Rs. 3,00,000	Rs. 77,28,000 (\$ 154560)
5. Sheltering of birds, squirrels & insects	Rs. 2,50,000	Rs. 64,85,000 (\$ 129700)
6. Removal of SPM, CO ₂ , SO ₂ from air	Rs. 5,00,000	Rs. 2,01,25,000 (\$ 402500)
Grand Total	Rs.15,70,000	Rs. 3,55,13,000 (\$ 710260)

* 1\$ = Rs. 50

A pipul tree which grow luxuriantly with an average weightage of 6 tonnes in India and South-East Asia has been chosen as an icon and its various environmental benefits received during its 50 years of growth have been valued at rupees three crores fiftyfour lac in this revision work.

This estimation is also applicable to other tree species with identical tonnage.

As in the original paper (and its revised versions) the value of timber has been omitted in this calculation.

The result of the revised figures are depicted in the Table 1 including the figures of the original calculation.

Details of Calculation

1. Production of oxygen

Average weight of full grown tree of 20 years (e.g. mango, aswatha, jackfruit, neem and arjuna trees)

Weight of trunk with branches	3.5 Tonnes
Weight of root system	0.5 Tonnes
Weight of young twigs with leaves	0.5 Tonnes

Total Weight 4.5 Tonnes

Fixation of 1 Mol. of CO₂ = Release of 1 Mol. of O₂

Total weight of oxygen produced = 4.5 Tonnes

Cost of oxygen @ Rs. 70/kg = Rs. 3,15,000

For coming 30 years production of branches

Young twigs and leaves approx. = @ 100 kg/year would be 3 Tonnes

Cost of oxygen production = Rs. 2,10,000

Value of total oxygen production = Rs. 5,25,000 during 50 years

Gross weight of the 4.5 + 3 = 7.5 Tonnes

Shedding of leaves during 50 years ≈ 5 Tonnes

Net weight of tree after 50 years of growth ≈ 6 Tonnes

2. Conversion to animal flesh and bones

Conversion to 10 kg of animal flesh and bones in a pair goat kids per year. In 50 years the cost of meat @Rs. 300/kg would be as follows

Total value of meat would be

Rs. 50 x 10 x 300 = Rs. 1,50,000

3. Controlling of soil erosion and soil fertility

Annual net benefit (including value of organic matter) would be Rs. 10,000 per year. In 50 years it would amount to Rs. 5,00,000.

4. Water recycling through transpiration

Capital expenditure

2 pcs. 1/2 HP pump = Rs. 6,000

Cost of land & construction of shade (including installation cost) = Rs. 1,50,000

Total = Rs. 1,56,000

Maintenance cost : Salary of 2 operators (24 hours duty) Rs. 10,000 p.m. x 12 x 50 = Rs. 60,00,000

Electricity charge

@Rs. 4/unit 1 unit per hour x 24 x 30 x 12 x 50 x 4 = Rs. 17,28,000

Total Rs. 77,28,000

5. Sheltering of birds, squirrels, insects etc.

Capital expenditure

Construction of cages with cost of land = Rs. 1,25,000

Salary of 1 expert @ Rs. 6,000 p.m.

Salary of 1 helper @ Rs. 4,000 p.m.

Total salary for 50 years = Rs. 60,00,000

Food for animals & insects @ Rs. 20 /day = Rs. 3,60,000

Rs. 20 x 30 x 12 x 50

Total Rs. 64,85,000

6. Removal of SPM, CO₂, SO₂ from air

Capital expenditure

Cost of two mega size high volume sampler with installation, along with setting up of a chemical system for removal of CO₂ & SO₂ after filtration of SPM from ambient air.

i) Two high volume sampler = Rs. 2,00,000

ii) Installation of unit = Rs. 1,00,000

Total = Rs. 3,00,000

Recurring expenditure

Salary of two technicians (@Rs. 10,000 p.m.) and two helpers (@ Rs. 5,000 p.m.) for running the system for 24 hours. Monthly Rs. 30,000.

@ Rs. 30,000 p.m. for 50 years (30,000 x 12 x 50) = Rs. 1,80,00,000

Consumption of electricity

Cost of 1 unit per hour @ Rs. 4 for 24 hours the cost is approximately Rs. 100

For one year 365 x 100 = Rs. 36,500

For fifty years Rs. 36,500 x 50 = Rs. 18,25,000

Total of capital and recurring expenditure :

(Rs. 3,00,000 + 1,80,00,000 + 18,25,000 + 36,500) = Rs. 201,61,500

How much oxygen we consume?

Each adult person inhale about 16 kg of air per day which contain minimum 3 kg of oxygen (20% of air) current market value of this amount is Rs. 210 (@ Rs. 70 per kg). Thus, Indian population of over 120 crores consume 120 x 3 kg crores of oxygen per day cost of which 120 x 3 x 210 = Rupees seventy five thousand fiftysix hundred crores (75,600 crores) per day corresponding value in West Bengal population (9 crores) would be 9 x 3 x 210 = Rupees five thousand six hundred seventy crores (Rs. 5,670 crores) per day.

In the animal world, other than human being a colossal amount of oxygen is consumed in respiration. During combustion process of fossil fuels in industries and transports huge amount of oxygen is consumed along with burning fuel woods for cooking purposes. Nearly 50% of Indian population approximately consumed 1 ton fuel wood per capita per year; considering average weight of the tree is 5 tonnes (with small & large trees) hence the total number of trees burnt per year in India is around 12 crores per year.

All such consumptions of oxygen are coupled with productions of carbon dioxide (CO₂), carbon monoxide (CO), sulphur dioxide (SO₂), oxides of nitrogen (NO₂NO) and suspended particulate matter (SPM) etc. and these processes leading to changed composition of air are silently counter balanced by green plants in various ways.

During the process of photosynthesis molecules of glucose and other carbohydrates are synthesized, besides release of free oxygen. Some amount of oxygen is also used up by the tree an amount far greater than

the rate of oxygen consumption, is released to the atmosphere for the respiration of animals and thus maintaining the oxygen balance of the atmosphere.

According to P. H. Raven, Director, Missouri Botanical Gardens, a disappearing plant species can take with it 10 to 30 dependent species, such as various species of insects, higher animals and even other plants.

When a tree is cut down the damage that inflicted is rather permanent in nature and cannot be recovered immediately. What is more significant, it is not a personal loss. It is a loss to the whole community, every individual of the locality would have to share this loss, the magnitude of which is still unknown to them.

The forest, the natural habitat for trees has been shrinking at an ever increasing rate. A detailed critical survey indicates that the world's original tropical rain forest had already been reduced by more than 40 per cent in 1970 to a total area of 935 million hectares, and that they are shrinking by about 11 million hectares each year. In India such shrinkage had been more than 60 per cent during the last 100 years and unfortunately, the major portion of such destruction was made after the independence. In future such process of destruction of forest with all probability may continue because of the irresistible pressure on land by ever increasing abnormal growth of human population.

If the business is allowed to continue as it is, our journey towards unavoidable calamity of population crash with disruption of law and order situation would be surely be utterly disastrous.

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GENE FUNCTION : GENETICALLY COMPATIBLE DIET AND LIFE STYLE FOR MANKIND

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A large body of information have been collected about the genes including their various possible locations and actions. The study of the genes have raised a number of problems which have not yet been analysed. It seems evident that the genes may be examined from three points of views.

1. as a mutational unit, 2. as a spatial unit and 3. as a functional unit (Levine - 1969).

It is evident that all sorts of life-activities of plants, animals and microbes have been regulated by the functional units of genes of respective species since their origin.

Such functional units could be broadly classified into six categories (Das, 2014).

1. Gene regulated input potential.
2. Gene regulated output potential.
3. Gene regulated bearing potential.
4. Gene regulated adapting potential.
5. Gene regulated multiplying potential.
6. Gene regulated survival instinct potential.

I. Gene regulated input potential :

Each and every species of the biosphere imbibes a number of compounds from the surrounding environment for survival. The chemical nature and sources of those compounds are supposed to be strictly regulated by the functional unit of the genes of respective species, as for example, higher plants can assimilate only atmospheric carbon dioxide and oxygen but not nitrogen though it is present there in plentiful (78%). Plants imbibe nitrogen from the soil. In absence of soil-nitrogen plants would die but they are unable to assimilate a single molecule of nitrogen from the sea of atmospheric nitrogen in which they are virtually immersed.

It is curious to note that specific genes which are capable to produce necessary proteins and enzymes to build up biochemical pathway for assimilating atmospheric nitrogen are present in the bodies of a number microbial organisms, e.g., *Azotobacter* and *Clostridium* and symbiotic Rhizobium group of bacteria along with blue green algae e.g., *Oscillatoria*, *Nostoc*, *Anabaena* etc., quite efficiently assimilate gaseous nitrogen from the air and produce nitrogenous organic compounds in their bodies and fix nitrogen to the soil that helps the survival of other plants and animals.

Higher plants through billion of years were unable to procure such type of gene sequence hence they have been still starving for soil-nitrogen.

Another good example for gene regulated input of nutritive substances is found in the case of Australian marsupial species Koala. They are able to assimilate only *Eucalyptus* leaves. No other plants leaves or nutritive fruits like apple, banana are non-edible food to them. If they are forced to feed with those nutritive foods they would suffer from mal nutrition and ultimately would die (Das, 2014).

It is, therefore, evident that input of food on other material into a particular species must be genetically compatible to that species. Otherwise, notwithstanding their nutritive values they would induce various physiological disorders in the long run.

In this connection a short description of evolutionary history of primates that may reveal the nature of genetically compatible basic natural diet of primates including mankind.

Man belongs to the order primate, a group descended from ancestral mammals that lived on the ground within forests. Primates were evolved as early as 75 million years ago during the Paleocene epoch of Tertiary Period. From this early primate stalk five sublines (suborders) evolved (Weisz 1969). Among these five suborders Hominoids were most advanced (super family) which again divided into two branches e.g. Pongids (Apes) and Hominids. Early man *Australopithecus africanus* was evolved from Hominids about two million years ago. It is interesting as well as equally significant to note that genetic speciality with regard to food habit of all species of live suborders of primates was more or less the same. They thrived on raw fruits and vegetables occasionally some species used to consume meats as well e.g. man. It was the basic natural diet which was well incorporated in their genetic and physiological systems.

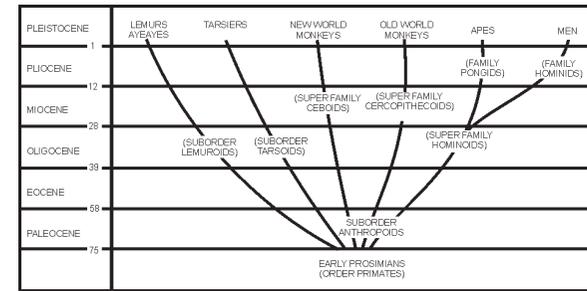


Fig. 1. The primate radiation. Numbers at left indicate past time in millions of years from Weisz, 1969.

Man during his 99.95% period of his existence was solely lived on his basic natural diet - raw fruits, vegetables and meals till the discovery of fire about 10 thousand years ago, when he started cooking at high temperature and gradually deviated from his basic natural food habit.

Cooking of food at high temperature (100°C) destroys vitamin C (it is also an antioxidant). Vitamin B₆ and B₁₂ are also destroyed. Proteins and enzymes are denatured. Consumption of extra quantity of fats and oils from oil seeds and milk along with sugar and salt create various physiological disorders like thickening of walls of blood vessels, obesity, diabetes etc. Carbondioxide, carbon monoxide, oxides of sulphur and nitrogen and suspended particulate matters emitted from the burning fuels pollute the environment and various hydrocarbons precipitate inside the alveoli of lungs of people, for which they require constant health care and medication. Such problems are significantly less among other species of primates who since many million years upto the present time have been strictly maintaining their genetically compatible food habit without any deviation.

Immunity level of those primates seems to be higher as compared to than that of mankind. Drinking of unfiltered water from river or dirty ponds hardly creates any problem to them. They do not require any constant medication or hospitalization. In fact, the first hospital exclusively for them perhaps is yet to be built up in this planet.

Fruits are one of the integral parts of the life cycle of a plant, fruits contain all the necessary nutrients e.g. carbohydrates, proteins, fats, vitamins, antioxidants, enzymes, minerals and hundreds of other organic compounds most of these are with medicinal properties.

It is curious to note that plants do not consume the fruits they produce but use them for dispersal of seeds with the help of animals and other agents for maintaining and extending their territorial dominance.

2. Gene regulated output potential :

Gene regulated output potential is related to the ultimate gene expression of a species and the nature of its transmission through generations.

Under this category of gene function all internal and external features of the species including defective genes and genetic diseases would come.

Gregor Johan Mendel (1822-1884) first demonstrated that through sexual union inborn characters of different varieties of a species (pea) e.g., tall and dwarfness, smooth or wrinkled surface of seeds are transmitted to the 2nd 3rd and 4th generation following a fixed mathematical ratio and recombination of those characters a new variety is evolved which is different from either of the original parents.

This one is a good example of gene regulated output potential which has been extensively used by the plant and animal breeders for producing new cultivars or varieties since more than a century.

It is important to note that such recombination of characters is rigidly intra-specific, inter-specific crossing largely fails due to development of incompatibility reaction. In rare cases, if the new borns survived they are unable to reproduce. Such character of gene regulated output potential is extremely useful and has been operating for maintaining the boundary lines of a species since their origin.

3. Gene regulated bearing potential :

Ants can carry a dead load more than 20 times of their own body weight. We find difficulty if it is more than our own body weight. Gene regulated bearing potential varies with species as well as with age of this species. Ants can bear quite high exposure to nuclear radiation as compared to that of trees of temperate regions (Holldobler and Wilson, 1990). We can bear all sorts of pollution and food adulteration upto a certain limit, after crossing a threshold limit they inflict serious damages. Human genes are very sensitive to smoke and nuclear radiation. A cumulative reaction occurs and after crossing a certain threshold limit incurable physiological disorders occur.

Human gene have some astonishing faculties which are not known to them properly. therefore, remain unused. A man can easily walk 10 km per day (upto the age 12-60 years) and if it is less than 2 km various physiological disorders e.g., obesity, knee trouble etc. develop. Our woman folk confined themselves in a small 2-3 roomed flat are susceptible to those troubles. The sedentary habit of our present life style is the root cause for many physiological problems (Das, 2013).

For the sake of changing present life style it would be good healthy practice if people use to walk down home from the place of work during afternoon. It would reduce the mounting pressure on public transport with saving fuel and reducing air pollution.

4. Gene regulated adapting potential :

Gene regulated adapting potential is to the nature of adaption of a species with various environmental conditions as well as with other species, e.g. symbiotic relationship between *rhizobium* group of bacteria with leguminous plants or zoozenthalli group of algae with corals and jellyfish.

Tropical plants are adapted with the tropical climate are not able to grow in temperate region. Same is the true in the case of temperate plants. If mountain animal yeaks adapted with the colder climate are brought down to the plane they are attacked with a strange liver disease and die within three months. Hydrophytes are adapted with the aquatic environment through evolving special organic system can not survive in mesophytic condition. On the other hand, mesophytes cannot survive in dry xerophytic condition.

The temperature range and rainfall and availability of water and soil nutrients play with determining factors for the setting of evolutionary pathway for gene regulated adapting potential.

5. Gene regulated multiplying potential :

Most species of bacteria have the capacity for doubling their population within 20 minutes. *Basidiomycetes*. fungus release their minute billion of spore in a formation of smoke. If all of them germinate the whole soil surface of the country would be covered up with the fungus. Plants like sunflower produce hundreds of seeds in a single flower. Penguins lay only one egg during their mating season.

Regardless of the fertility index the gene regulated multiplying potential of a species always remains well below the carrying capacity (largely determined by the green coverage, soil nutrient, availability of food and water etc.) of its own territory.

A population crash or forced migration is inevitable if any species continue to multiply crossing the limit of carrying capacity of the territory. This phenomenon can be demonstrated during the culture of bacteria in a laboratory. As soon as availability of the food in the medium is exhausted 90% - 95% population of bacteria would be wiped out.

The carrying capacity for human population in this world is only one billion. Just less than 200 years ago in 1830 the human population of the world was one billion at per with the carrying capacity. It took about

two million years to reach the number of one billion. The next billion was added often only hundred years in 1930. Next 4.6 billions have been added just within 84 years in 2014. The world population is going to reach the figure of 10 billions at the end of this century or in the early part of next century.

With reference to the gene regulated multiplying potential this growth rate of human population is highly abnormal and unprecedented among other species of primates including mankind since its evolution and cannot be maintained with the limited resources of the earth. Its abnormality can be proved by a simple mathematical equation which would show that – if this growth rate is maintained for 5 thousand years the total body weight of human population would be the same as that of earth 10^{24} kg, itself.

Using of science without having scientific temper of people is the main cause of population explosion since last two centuries by using the modern development of medical science the death rate, specially infantile mortality has been controlled quite successfully in all sections of the society but not the birth rate. Using of science with gross unscientific handling has been dislodging the ecological balance all over the world.

Population explosion is the primary problem of India and other developing countries, other problems are secondary ones and mostly generated from the primary problem. Unless and until the population growth is properly subdued sustainable solutions of other problems are almost impossible to achieve.

6. Gene regulated survival instinct potential :

An exceptionally strong survival instinct seems to be incorporated with the functional genes of each and every plant and animal species. Most of the tiny insects including ants and flies have enough capacity for sensing eminent danger if any moving object comes nearer to them, through a reflex action they immediately try to escape or attack the unknown enemy using their defensive weapons whatever they possess. During the course of evolutionary process numerous varieties of highly useful effective defensive organs and mechanisms have been evolved in plants and animals which help them to survive against attacking of the predators and at the same time, help the predators to obtain their food through hunting they preys. In plants species these are thorn, bristle, thick cuticle, latex, poisonous chemicals, mimicry special contrivances for catching insects etc. In animal species these are tooth, nail, horn, muscle power, power of jaw sound of roaring, capacity of running, mimicry and social behavior specially for accumulation of power and strategy during joint hunting.

Survival instinct of a species seems to be present from the embryonic stage and continued upto the end of the life span. A strong inclination to complete the life cycle is noticed in plants and animals. Plants embryos are capable to survive in the seeds for an indefinite period of time and using the mechanism of dormancy they are able to select ideal environmental condition for germination and growth of young embryos. The period of dormancy may be a few months or many years but after germination, in the case of annual plants the survival instinct, persists only upto the reproductive stage, after fertilization and producing seeds, plants are not able to survive even under optimal condition of the environment. But in case of perennial plants the gene contains survival capacity for an indefinite period of time along with the incorporation of survival instinct. In the animal world survival instinct of the functional unit of gene seems to work in various ways.

Most of the animal species including ants have got inborn faculty of identification of poisonous plants, poisonous fruits, and toxic substances in their environment and carefully avoid those non edible substances. Ants (*Paratrechina longicornis*) are able to identify from 0.5 cm distance with the help of their pheromone system, poisonous food materials e.g., suger particles mixed with deadly poisonous copper sulphate, Beygon or gamexane, they do not consume those materials or carry them to their hole. If any ant is killed by those poisons, they never carry their dead bodies to their hole, otherwise they are very quick to accomplish such job (Das, 2002).

A large number of animal species posses inhesent faculty for using various plant species or other animal species for medicinal purposes. Cats show special interest to eat leaves of *Acalypha indica* for curing their physiological disorders. Birds are always eager to eat terminal buds of *Ectipta alba* for maintaining the growth of their feather. Some species of birds collect red ants and put inside their feather to kill the mites for controlling mite infestation.

Baby sea-turtle from the very moment of coming out after breaking the shell, run towards the sea. Sometimes they have to cover a long distance but they never stop or change the direction from their destination.

All mammalian babies including human babies know how to get their first meal by sucking the teat of mother breast.

In this connection the seasonal migration of birds, fish whales and many other animal species may be sited as a gene regulated phenomenon for their survival. Genes of the respectively species seems to activate them for choiceing right time with proper direction and

destinction which they repeat generation after generation. Their offspring who are going to start maiden voyage seems to possess enough capacity to cover thousands of kilometre distance with same speed and direction as that of adults apparently without taking any help from their parents.

A hard, often bitter struggle for existence continues throughout the life span. In case of human society if any person fails to get a decent living he would start to beg, borrow or steal. All sorts of social problems of law and order, social unrest, agitation, movement and big changes of societies and genesis of revolution are being initiated from the survival instinct of the people.

It is interesting to note that in plants and animals young ones raised with proper care and protection to keep their progeny intact but when the young ones become adult they do not repay anything to the donor at the senescent stage. Older ones often expelled from the herd roaming alone in the wilderness and soon perish. In plants, young growing leaves receive most of the nutrient from the fully expanded leaf situated underneath (Das and Leopold, 1963). When the young leaf becomes adult and full grown it starts to supply nutrients to the young leaf situated at the top but a single molecule of nutrient repaid to the older leaf. It is curious to note that from the main vascular system not a single molecule of water or nutrient enters in the old senescent leaf but the young leaf bud growing at the axil of the senescent leaf would get all the supply from main vascular system. The suction pressure of leaf-cells rapidly diminishes with ageing of the leaf and becomes nil long before reaching the leaf in senescent stage, on the other hand, mobilization of nutrients from the expanded leaf to the upper young leaf continues till reaching the senescent stage of the donor expanded leaf, as a result, the expanded leaf losing its dry weight till the formation of abscission layer at the point of connection between the leaf petiole and the mother plant which causes the leaf fall without damaging the mother plant. If any balance of nutrient left in the falling leaf it enriches the soil and recycles back to the plant. Nothing is lost or wasted in nature. In human society there is many save guards and arrangements for looking after the senior citizen which totally absent in nature. The demographic pattern of many advanced nations looking like an inverted pyramid. Population of older people is larger than the younger ones, as a result liabilities are growing with reducing assets. It is an unnatural order not compatible with their genes, It necessitates without any question, that older people should enrich the society with whatever productivity they have till last day of their life.

It reveals from the foregoing discussion that the functional units of primates genes are not experienced with the continuous exposure to smoke from the burning fuels, cooked food, commercially prepared fats and oils, sedentary habit, high decibels sound and continuous exposure to (nuclear and microwaves) radiation. These factors have been created many unresolved problems of human society it seems that any effort for minimizing these factors would be helpful to the mankind for achieving a sustainable life style with improving economical and environmental condition as a whole.

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AN OUTLINE OF A SCHEME FOR FRUIT TREE AND VEGETABLE CULTIVATION ALONG WITH PISCICULTURE ON COASTAL REGION USING MARINE WATER AS AN AUXILIARY SOURCE FOR IRRIGATION AND FERTILIZER

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INTRODUCTION

Earlier publications of the author (Das 2013 and 2014) have indicated that raw fruits and vegetables are the genetically compatible principal natural diet for the primates: man is no exception. They have been living on through millions of years with such diet without much problems. Each and every group (order) of animal possesses its own kind of natural diet which is compatible with its gene regulated input potential (Das, 2014). Any deviation of such diet seems to create problems in the biochemical path-way of assimilation with developing various physiological disorders and symptoms of malnutrition. As for example, Eucaliptus leaves are the natural diet of Australian marsupial Koala and bamboo shoots are natural diet of Chinese Giant panda. Any deviation of their natural diet even with more nutritious fruits like apple, banana, orange etc. would develop above mentioned problems in them. Genetically compatible diet seems to play a key role for maintaining the sustainable ecosystem in biosphere.

In India from very ancient time fruits have been regarded as the most sacred and ideal food for mankind. Ancient sages used to live on fruits as their only diet. Any physiological problems they would suffer is not known. In our country fruits are regarded as symbol of purity and superiority. Our offerings to Goddess are always consisting of various kinds of fruits and flowers.

In earlier publications of the author (Das 2013 and 2014) it is advised that at least one meal should be taken per day with raw fruits and vegetables and the other one may be cooked with solar energy or smokeless closed circuit oven.

To feed a large population of our country an extensive increase of fruit tree plantation covering a vast area is imperative. Fruit tree plantation bears some significant advantages over grain crop cultivation. Fruit tree

plantation is more natural practice than the monoculture cultivation of grain crops in agricultural fields. In plantation of fruit trees ploughing of the soil is not required. Requirement for irrigation and manuring is almost negligible.

Chandra (2013) published a scheme for an extensive fruit tree plantation covering the vacant land on either side of national highways stretched over many thousands kilometre of our country. Fruit trees should be chosen according to the climatic condition of the region. Local youths would be employed for looking after the plantation and selling the produce at a fair price to the local people. At present many of the local youths have been working as middle men who are purchasing cultivated crops and vegetables from the farmers at a very-lower price and selling those to the market at an ever increasing higher price. If those middle men are converted to the fruit growers the ever increasing price of crops and vegetables of the market may be controlled.

Fruits, Vegetables and Pisciculture on Coastal Region

Due to geographical location, India has been enriched with a vast coastal area which remains almost barren and vacant. This vast area of vacant land can be utilize for growing fruits and vegetables with addition of water minerals from the sea. Marine water is basically a concentrated soil solution. All the minerals that present in the soil have been washed out and carried down to the sea by the rivers and streams through ages. Moreover, the marine water has got some of its own minerals. This marine water, as per requirement, could be diluted with sweet water and can be used for growing fruits and vegetables. Marine water is very poor in nitrogen, hence, as per requirement some amount of nitrogen fertilizer shall have to be added with diluted marine water.

The outline of technology for growing fruits and vegetables would be as follows. On the coastal region quite a distance away from the tidal zone a shallow under ground reservoir of size e.g. 40' x 8' x 4' (H) properly insulated with concrete lining is to be constructed. This would be used for storing diluted marine water enriched with nitrogen fertilizer. Just by the side of the reservoir, on the ground, a long brick built container of size 40' x 10' x 4' (H) is to be constructed and filled up with good quality of garden soil (sandy loam soil). This one would be the soil-medium for growing fruits and vegetables. Irrigation and manuring of the soil would be done by spraying diluted marine water from the adjacent reservoir with the help of small centrifugal pump or hand bucket.

On the soil bed, at the back row, fruit trees like papaya, banana, guava, pummelo orange, apple, grape, sabeda etc. can be planted. Along the front row green vegetables e.g. tomato, carrot, beat, radish, pea, onion, garlic, ginger, lettuce, cauliflower, pear, chilli, coriander leaves, water melon etc. could be grown.

The reservoir can be divided into three or four compartments for culturing different species of small fish or without any compartment for large fish. A nylon net of extra ordinary large porocity my be placed covering the floor and four walls of the compartment. By simple lifting the net larger fish would be caught eliminating the smaller ones. A defuse lighted condition is necessary for optimal growth of phytoplantons and blue green algae to feed the fish. Hence, top of the reservoir is to be covered with a tarpaulin allowing optimal lighted condition inside the reservoir.

Indispensible role of Phytoplanktons for maintaining productivity of aquatic ecosystem

Phytoplanktons are the aquatic microorganisms, mostly consisting of blue-green algae, e.g., *Oscillatoria*, *Nostoc*, *Anabaena*. Through photosynthesis they fix carbon from atmospheric carbondioxide in organic carbon compound glucose. They also fix atmospheric nitrogen in organic nitrogenous compound protein. The very existence of whole aquatic animal world is depended on them. Hence, in a shallow reservoirs for achieving best harvest in pisciculture the very presence of phytoplanktons and their optimal growth rate at defuse sunlight should be properly maintained.

The source of sweet water for diluating of marine water may be arranged by digging a deep tubewell in nearby suitable soil or from water of the lake, river or local municipal water supply line.

Movable system of growing green vegetable-cum-pisciculture

The whole system of growing screen vegetable-cum-pisciculture can be arranged with a large tank of galvanized iron sheet of size 18' x 6' x 3' (H) mounted on 6 wheels. The tank would be used for storing diluted marine water and fish culture. It may be divided into three compartments for culturing three kinds of fish. A nylon net of extraordinary large porocity may be placed covering the four walls and the floor of the compartment for catching the fish.

On the top of the tank six light weight movable soil containers of size 6' x 3' x 1½' (H) are to be placed. The structure of the soil container frame shall be constructed with light weight galvanized iron rod. The floor of the container shall be covered with strong galvanized iron net and a good quality of nylon net of line porocity shall be spread on the top of the iron net. The four walls of each container shall be covered with light weight fibre sheet. The container shall be filled up with good quality of garden soil or sandy loam soil on which green vegetables would be grown.

The whole weight of the container would be borne by the two long steel rods of size 6'2"x½" (diameter) and fixed in position at the bottom of the container with four small wheels at their ends. For smooth moving of the container two narrow rail lines of size 12'x½"x1" (H) are to be placed under the wheel. These lines of 12' long would be fitted with extension of 3' length on either side of the tank with proper supporting system which can be lower down with hinge and nut bolt when not used. These extended 3' long rail lines with supporting arrangements shall be used for carrying the load of soil container during opening of the tank.

For constant irrigation four dozens of absorbent wicks would be hung from the lower soil surface to water surface and the distance between the two surfaces should not be more than two inches. To keep the fertility index of the soil at constant level manuring with marine water from the tank should be added once in a week with hand bucket. Excess of marine water would come back to the tank. There would be no wastage of water or fertilizer in this system.

This one is a movable system, it can be drawn by a tractor engine or motor car to the market place or source of sweet water and marine water for filling up the tank or any desired location e.g. local garden, private garden, kitchen garden and rooftop garden etc.

Floating Vegetable cultivation and Pisciculture in the tidal zone of Sundarbans

These two former systems, however, cannot be operated in the tidal areas of Sundarbans which are flooded with sea water every day during high tide. Under such condition growing of green vegetables-cum-fish culture would be possible by using floating barges (Panigrahi and Das 2009-2010). Dilute sea water enriched with nitrogen is kept in the hollow chamber the barge and removing the wooden platform soil container for

growing green vegetables are placed in position two inches above the water surface. Absorbent wicks for constant irrigation of the soil would be hung from the lower surface of the soil to the water surface. Pisciculture can be done conveniently in the diluted sea water stored in the hollow chamber of the barge.

This floating barges can be used in the creeks of Sundarbans as well as in lakes, river and coastal regions of our country.

Since long time floating gardens have been maintained in rivers of Mayanmer and Dal Lake of Kashmir, India but these are problematic with wastage of fertilizer and pollution of water. In the proposed scheme for growing fruits and vegetables-cum-fish culture in the vast barren coastal region of our country, there is no chance of wastage of water or fertilizer on the contrary unimaginable amount of water and mineral of the ocean could be recycled in these system.

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OUTLINE OF SCHEMES FOR GENERATION OF ELECTRICITY AND PURE DRINKING WATER FROM NON CONVENTIONAL SOURCES

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FIRST SCHEME

GENERATION OF HYDRO-ELECTRICITY ON DIRECT VERTICAL APPLICATION OF GRAVITATIONAL PULL

After Independence one of the spectacular endeavours adopted by the Government was the initiation of a number of River Valley Project by constructing large or medium size dams at the suitable position of various rivers of the country. Objective of the project was extending irrigated land of the country, controlling of flood, supplying of water during dry season and generating hydroelectricity.

Since the birth of civilization many dams were constructed in Middle East, India and China but no dam persisted forever. Their longevity was depending on the rate of siltation or salinization or changing the course of river.

Eight thousand years ago, the Sumerians built an irrigation- based civilization between the rivers Tigris and Euphrates then lost it to salinization.

In India about 2.300 years ago, during the time of Chandragupta Maurya a massive *Sudarsan dam* was constructed in Gujarat on the confluence of three ancient rivers named *Palasini*, *Sikta-bilasini* and *Arjikia* forming a vast Sudarsan reservoir. The dam and the reservoir functioned perfectly well. It was thoroughly renovated during the time of Skandagupta but ultimately the dam and the reservoir became totally extinct. Numerous dams were constructed with almost all the rivers of India, but none of them survived for an indefinite period of time solving the water crisis in agriculture on a permanent footing. Modern technology, perhaps, was first applied in construction of Veri dam on the Veri river by famous engineer Ballav Bhai Desai at the native state Gondal in Gujarat as early as 1900 AD. The height of Veri dam was 37 feet with 30 sluiceways. It used to supply enough water throughout the year for irrigation, industrial and drinking purposes for more than 75 years, but gradually stopped functioning due to heavy siltation.

Most of the dams of our River Valley Projects have been constructed about 50 years ago. They are already become half filled with siltation and instead of controlling flood they are creating man made devastating floods during the rainy season.

Hence, in our country the future of these dams is quite bleak and the generation of hydroelectricity would be greatly hampered.

Hydroelectricity generated from these dams is basically from the energy of gravitational pull. It's layout is on a horizontal sloping path with demenishing height from the sea level. This system is very much complicated affecting the ecosystem of the entire environment.

It would be much simpler and sustainable if this horizontal system is converted to a vertical system. In the vertical system the dam is to be constructed on the top of a tower. Actually it would be a very large size tank made up of iron sheet lining with stainless steel. The size of the tank is to be determined from the calculation how much electricity is needed from running the turbine.

Minimum two turbines will be required, one for generating electricity for commercial purposes and the other for running a pump for recycling the water back to the tank.

To minimize evaporation loss of water the top of the tank would be covered with metallic sheet and recycling of water would be run through a closed system. Rain water harvesting arrangement shall be fitted on the top of the tank which would replenish any water loss during operation. Excess of rain water may be used for commercial or irrigation or recharging of ground water purposes.

For thorough cleaning or repairing of the tank the whole volume of water may be diverted to another tank of same size built as the base of the tower by digging the earth and perfectly water tight with brick and cement lining. During refilling the overhead tank the water should be passed through a suitable strainer, so that perfectly debris free clean water could be stored.

Instead of constructing enormous size overhead tank it can be replaced with a very small size e.g., 750 litre capacity tank can be used for generating electricity from the energy of gravitational pull. The details are given below.

SECOND SCHEME

GENERATION OF ELECTRICITY FROM AEROGENERATORS ON APPLICATION OF GRAVITATIONAL PULL

Among nonconventional energy sources Aerogenerator possesses some special advantages, e.g., i) It is totally air pollution free, ii) Its running expenditure is very small, iii) It requires very small space, even under the tower, cultivation of vegetables is possible. But its main disadvantage is for running the turbine, it requires a minimal velocity of air flow 3.5 metre per second and that velocity is available constantly only at a few places of a country and that also varies with seasonal changes. Hence, the total output of electricity is very small and cannot be increased with increasing demand.

In this scheme instead of airflow gravitational pull has been used for revolving turbine of the generator. The necessary rpm for revolving turbine has been generated with up-to-date gear system.

The summary of the scheme is as follows :

On the top of 45' or 15 metre height tower a water tank of 750 litre capacity is to be fixed in position. Under this tank two cisterns No. 1 & 2 of 20 litre capacity each, with 0.5 metre distance apart from each other are to be fixed in position. These cisterns would get supply of water from the tank. Under the water tank and over the cistern a strong iron board of size 1m x 1m shall be fitted with supporting arrangement.

This board will be used as the platform on which two pulleys No. 1 & 2 of 5 cm diameter each and aerogenerators (without blade) of capacity 400 watt each with gear system shall be fitted in position.

Fitting of pulleies No. 1 & 2

Two pulleies No. 1 & 2 shall be fitted 50 cm apart from each other and 20 cm distance from the tank each pulley with rotted on central axle of 7 mm width 70 cm length of strong steel rod of size 1m either ends bent at right angle for 10 cm long each. This central axle will not revolve but fixed strongly on the board 10 cm above with help of its bent legs at the right angle direction of the cisterns. The pulleies will revolve freely on this central axle. On these two stationery axles two strong revolving pipes with 7.5 mm width 70 cm length shall be fitted.

These two revolving outer axles shall be attached or detached with the pulley No. 1 & 2.

With the help of an electronic sensor system such operation easily could be performed. A gear system shall be fitted with the revolving outer axles and Aerogenerator.

The gear system will adjust the necessary rpm of the generator. The gear system is very critical one, it determines the optimum rpm of Aerogenerator.

At the end of two revolving axles two flywheels of 12 cm of diameter shall be fitted. These two flywheels would maintain the momentum of revolution of outer axle when they are detached from the main pulleys No. 1 & 2.

Operation of the system

One strong belt preferably made from suitable material for this purpose shall be chosen. Its length would be over 30 metre and breadth would be 2 cm. Two buckets of 20 litre of water holding capacity each, shall be fixed at either end of this belt.

At the base of the tower a reservoir of water of suitable size is to be built up an Aerogenerator with special type of blade shall be fitted for recycling the water. Top of the reservoir is covered with a metallic sheet. On the top of the tower the belt will be placed on the pulley No. 1 & 2 simultaneously and the bucket No. 1 to be placed under the cistern No. 1 through a hole made on the platform. The other end of the belt fixing with the bucket No. 2 would just touch the surface of the reservoir.

The bucket No. 1 when would touch the electronic sensor fitted at the bottom of cistern No. 1. The cistern will release 20 litre of water into the bucket within five seconds. There is also an electronic break system which hold up the bucket No 1 till fully filled up with water. The break will be released and allow the bucket No. 1 to go downward. At the same time the bucket No. 2 will move upwards siphon washer are fitted at the base of each bucket. When the bucket No. 1 touched the top of the basal reservoir, there is a five cm long hook which would help to release 20 litre of water by raising the siphon washer. There are number of holes round the hook and the 20 litre of water would enter the reservoir in a form of jet which will rotate the blade of the generator. The bucket No. 2 by this time will reach beneath the

cistern No. 2 and filled up with water through touching the sensor wire and it will come down with lifting of bucket No. 1 towards the cistern No. 1. The water of the bucket No. 2 also would help to run the turbine as that of bucket No. 1.

The water collected in the basal reservoir would be recycled with the help of centrifugal pump which requires very small amount electrical energy for its operation. The electricity generated from the miniturbine in the basal reservoir will be used for running the pump and electronic sensor system.

Role of Electronic sensor in this system.

In this pilot project electronic sensor have been used in four occasions.

1. When the bucket No. 1 & 2 come closer to their respective cistern No. 1 & 2 and touch the hanging point of the sensor, water of the cistern will be released in the bucket and fill it up within 5 seconds.
2. The movement of pulley No. 1 & 2 will be stop temporarily with help of sensor break for 5 seconds during filling of the water in the bucket No. 1 & 2.
3. An electronic sensor system helps the generator No. 1 to revolve always clockwise. One 4 cm long socket with ridge and hinges at the inner surface mounted on the outer axle when this socket move backward towards the pulley No. 1 it would firmly attach the outer axle with the pulley No. 1. After 5 seconds the break would be released and the bucket No. 1 loaded with water move downward with the force of gravitational pull and the pulley No. 1 would revolve clockwise along with revolution of generator No. 1 with its gear system and flywheel (In this occasion calculation should be made so that, a magnitude of force of gravitational pull which is directly proportional to the load of water of the bucket should be higher than the force required for revolution of the generator No. 1). Just before contact of the bucket No. 1 with the surface of the basal reservoir socket No. 1 would move forward and fully released the outer axle from pulley No. 1 which allow to revolve the aerogenerator No. 1 with its gear system clockwise. The momentum gained by the flywheel would help this rotation.

During the rotation of flywheel bucket No. 2 would receive the water from cistern No. 2 and socket No. 2 would move backward and

firmly connect the outer axle with the pulley No. 2. A few second after releasing the break bucket No.2 would move downward with the force of gravitational pull and pulley No. 2 with generator No. 2 would rotated anticlockwisely and just before contact of bucket No. 2 with the hook of base reservoir movement of socket No. 2 would release the generator No. 2 from the movement of pulley. As a result the generator No. 2 continuously rotated anticlockwisely from the momentum gain by its flywheel.

4. Water thus collected in the basal reservoir will be recycled that to the tank on the top of tower. A pump will be fitted at the top of the tower and its long pipe always will be filled up with water of the basal reservoir. This pump require very small amount of energy and with the help of electronic sensor it would start and stop automatically.

For the commercial production of electricity larger number of aerogenerator with higher capacity could be used. The most unique advantage of this system is on the fact that any magnitude of force necessary for rotating the turbine would be readily available through increasing volume of water of the container.

For commercial use larger volume of water in cylindrical shape of container is to be used and the height of the tower is to be adjusted accordingly. Larger volume of water also would be helpful to run the turbine of the basal reservoir which supply the power to run the entire system. So the electricity generated from the main turbines could be fully utilized for commercial purpose without any deduction for running the system.

An alternative system for operating the Aerogenerator

In this system a strong axle of one metre long and one cm thick shall be fitted in position on the platform with the help of two ballbearing ring holder at 20 cm height from the platform, so that the axle would rotted freely. It will be fixed at paralled with the cistern No. 1 & 2 and 20 cm distance from the cistern. On either end of the axle pulley No. 1 & 2 will be fitted. The bredth of the pulley will be sufficient enough for winding 15 metre long rope. At the end of the ropes bucket No. 1 & 2 will be fixed.

During the operation when bucket No. 1 would filled up with water from the cistern No. 1 at the top, it will go down due to unwinding of

the rope in clockwise direction at the sametime bucket No. 2 which is present at the base of the tower will go up due to winding of the rope with the rotation of the pulley No. 2. When the bucket No. 2 will be filled up with water it will go down and the bucket No. 1 will go up with rotation of the pulley No. 1 in anticlockwise direction. In this system a special type of Aerogenerator is to be fitted which could generate electricity from clockwise as well as anticlockwise rotation. Other fittings would be the same, the fittings of the generator with the axle would be the same as described earlier. This system is simpler one, there is no need for using outer axle its attachment and detachment with the pulley and rotation of flywheel etc.

INFERENCE

Success of the pilot project would open a new source of nonconventional electrical energy almost infinite in amount and totally free from air pollution. The machine can be setup any place of the country and would operate continuously 24 hours irrespective of weather condition. The machine does not require supply of any raw material except a few litre of water per month to compensate the evaporation loss. (The upper and lower reservoirs are covered with metallic sheets and even buckets are to be covered leaving a small hole for entering the pipe of the cistern the evaporation loss of water would be minimal level).

As compared to other sources it requires a very small space and manpower requirement is limited to a few supervisor.

Hence, it is expected that the cost of electricity would be the cheapest in the market and available to any amount with increasing demand.

THIRD SCHEME

A LARGE SCALE SYSTEM FOR GENERATION OF ELECTRICITY FOR GENERAL USE, SPECIALLY FOR CHARGING BATTARIES BY FIXING DYNAMOS WITH RUNNING WHEELS OF INDIAN RAILWAY

Indian Railway belongs to the group of largest Railways of the world. Its many thousand miles extended network of rail line almost covered the entire geographical area of this subcontinent. Hundreds of mail, express and local trains and goods trains are running throughout day and night.

A huge amount of energy is being spent to keep running the wheels 24 hours. Our Scheme is to generate a significant amount of electrical energy by fixing suitable dynamos using up-to-date technology with the axle of running wheels and using the electrical energy for commercial purposes.

Indian Railway has already been using such technology for electrification of the compartments and headlight of the engine etc., but large scale production of electricity for commercial purpose has not been considered because of following two factors.

1. Price of electricity was quite cheap (Rs. 0.25 per unit, now it becomes Rs. 5/- per unit).
2. There was no demand for electricity for charging of batteries etc. Now electrically operated cars and buses with 25 Volts batteries have already come in the market, but the main obstacle for commercial success of the electrically operated transport is the recharging problem of these batteries. If the Indian Railway could extend their technological help for recharging those batteries the commercial success of those electrical transports would be possible at the same time Indian Railway could earn a sufficient amount of revenue which would make up each deficit budget into an ever increasing profit making one.

Our scheme is to fix a 4 wheeler Trolley (with smaller size of wheel for increasing rpm) beneath the central position of the compartment floor in between the 2 sets of regular wheels. Regular wheels shall not be disturbed.

Inside the Trolley there will be 2 strong revolving axles with running wheels at there ends. Two dynamos (say 5KV generators) suitable for the purpose shall be fitted with the revolving axles using up-to-date gear technology for adjusting the necessary rpm of the dynamos. The regular servicing of these dynamos with their gear system can be done by fixing a strong steel shutter on the floor of the compartment just above the Trolley. The shutter always would remain closed with special lock any key and could be opened by technicians.

Storing and Distribution of electricity

Electricity thus generated from dynamos (say 5KVX4 = 20 KV) will be stored through recharging of 24 Volts or 12 Volts series of batteries kept in closed long trays on the roof of the compartment.

After 6 hours these batteries will be replaced with new series of chargeable batteries. Thus 24 hours journey of a train 4 series of batteries may be charged.

Alternatively a special wagon may be constructed for this purpose. Trolley with dynamos shall be fitted under the floor of the wagon. Rechargeable series of batteries in long trays shall be kept on rows of bunks inside the compartment. Each battery will get electricity through supply line by using simple technology. After 6 hours of running these batteries will fully charge and the wagon which is attached at the end of mail or express train shall be replaced with a new wagon containing chargeable batteries. Charged batteries fully may be distributed to the user through local petrol pumps.

The local trains that run with electrical energy, the electricity generated from the dynamos may be transmitted through pantograph and another parallel traction line to the grid system for distribution to user.

The successful implementation of the Third Scheme may initiate a new Age of an ecofriendly electrically operated road transportation with sun-setting of petroleum Age.

FOURTH SCHEME

A LARGE SCALE SYSTEM FOR PRODUCTION OF PURE DRINKING WATER AND SALT BY DISTILLATION OF SEA WATER AND ARSENIC CONTAMINATED WATER

Most of the salt of Indian markets comes from salt factories of Gujarat. In Gujarat during the long summer season the average air temperature in daylight is over 40°C and salt concentration in coastal region is very high about 1.5%. Hence, many large salt factories have been established along the coastal region of Gujarat.

The technique of salt production is quite simple. Large rectangular size of salt pans are constructed in rows, their height is low, placed in slanting position and painted with black-mat colour. There salt pans are filled up with sea water. By evaporation of water crystalline salt is deposited on the floor and manually removed and stored on top of the salt pan.

It is time consuming process it takes a long time for complete evaporation of sea water in a salt pan. There is also a factor to be

considered when 1.5 gram of salt is produced 98.5 gram of pure distilled water evaporated and lost in the air. If this pure water is captured a huge amount of drinking water can be obtained for general use.

It is noticed that in a solar cooker the temperature inside the cooking chamber rapidly increases 110° to 115°C within 20 minutes when it is placed under direct sunlight and outside air temperature is only 35°C. Such rising of temperature is due to the effect of concentrated infra-red solar radiation inside the black-mat colour cooking chamber.

This technique may be used for distillation of sea water. In that case an extra large solar cooker is to be built up e.g., 4'6" x 4'6" x 1' (H). On the top of the box one heat proof glass and top of it one very clear best quality 3 mm thick glass is to be fitted in position and it would be perfectly air tight. Inside the box the floor with the four sides is to be properly insulated with 2' thick glasswool and lined with black-mat painted aluminium sheet.

The box would be opened by removing one side panel and closing again with fitting the panel in position and fully airtight with flying nut and screw.

For generating water vapour from boiling sea water an aluminium box painted in black-mat colour of size 4' x 4' x 9" (H) is to be constructed. Its lid would be air tight. For easy movement the box will be mounted on four small wheels and a strong handle will be fixed on the side facing the outside door of the unit.

The black box will be filled up with sea water up to the height 6" leaving 3" empty space on the water surface for developing vapour pressure during boiling of water. An one 1" x ½" long outlet pipe is to be fitted at the corner of the lid facing the door (opening panel) of the unit.

After filling up the black box with sea water and placing inside the unit the outlet pipe is to be connected with the main outlet pipe with the help of a 1" x ½" socket. The door of the unit shall be closed and perfectly air tight with help of flying nut and screw.

When the unit is exposed to sunlight the temperature of the water of the black box will rapidly increase due to effect of concentrated infra-red ray (heatray) of the sunlight. The water will start boiling and water vapour would come out due to increasing vapour pressure.

The water vapour passing through a spiral shape outlet pipe ultimately will be converted to a liquid state and stored in a tank.

For standardization of the technique a Pilot Project should be initiated. The best venue would be any salt factory of Gujarat in which salt pans are constructed in a row at least 10' apart from each other. For this project two such salt pans shall be chosen. On the empty space of the left side of one salt pan 25 solar distillation units shall be placed in position in a vertical row, opening door of each unit shall be faced on the extreme left side. Five feet long and three inches height two rail lines shall be fitted with each fitting unit which would help for pulling out the black box outside the unit.

The long spiral outlet is to be passed 2' depth under the soil of the salt pan. Until it reaches the empty space of the right side of the salt pan. Under the soil of the empty space a long common outlet pipe of 4" diameter is to be placed. 25 spiral outlets of distillation units are to be connected with the common central outlet.

On the right side of the second salt pan similarly 25 distillation units are to be placed in a horizontal row and their 25 spiral outlet similarly would be connected with main central outlet. The central outlet is to be connected with a large under ground tank made up of stainless steel in which distilled water from 50 distillation units will be stored.

In this connection it may be mentioned that instead of spiral shape of outlet it may be bent in zigzag shape and made up of stainless steel of 1 cm diameter. The soil is a good absorber of heat and under ground soil would remain cool mostly due to the constant evaporation of water from the soil pan which would absorb the latent heat of evaporation from the base of soil pan.

Outside the distillation box a vapour pressure controlling valve is to be fixed at the point of connection between inner outlet and outer outlet tubes. It will help to release the water vapour inside the outer outlet tube when the vapour pressure of the black box would increase to an optimum level.

A thermometer is to be fixed inside each box which can be read from outside.

Water holding capacity of each black box of distillation unit is 217 litre. Hence, 50 distillation units would contain 217 x 50 = 10,850 litre

of sea water after complete evaporation of sea water about 10,000 litre distilled water will be obtained.

If the salt concentration of sea water is 1.5%, the minimum salt production would be 3 kg per unit. Hence, from 50 units total 150 kg of salt would be produced. At present the minimum market price of salt is Rs. 10, hence, the total price of 150 kg of salt will be Rs. 1500.

On the other hand the current market price of distilled water varies from Rs. 10 to 20 per litre but it's demand is small. If a few grams of minerals are added with the distilled water it would be an ideal sample of mineral water for drinking purpose. The minimum market price of such mineral water is Rs. 10 per litre. Hence, the current market price of 10,000 litre of mineral water will be Rs. 1,00,000.

This equation clearly shows that when a salt pan owner earns Rs. 1500/- by selling 150 kg of salt he loses about one lac rupees worth of drinking water through evaporation of pure water from his salt pan. This equation would provide impetus to develop this technique and large scale commercial production of mineral water with 70 folds more profit along with salt production in his factory.

It is to be noted that this sea water distillation unit can be operated throughout 24 hours irrespective of light and darkness and weather condition. For that purpose 4 low wattage electric heating coil are to be fixed inside the insulation layer at the base of the unit. This heating element would receive current from a suitable battery.

The recharging of the battery at nominal cost would be possible if Indian Railway Board would implement our third scheme for large scale system for recharging of batteries from dianamos fitted with the running wheels of trains as described earlier in this paper.

The distillation unit also can be used for large scale production of safe drinking water from arsenic contaminated water in arsenic affected districts of West Bengal and Bangladesh. The unit also can be used for cooking purpose. It holds 16 large size food containers sufficient for a large family and it could be operated day and night.

The vast coastal line of India is most valuable geographical asset of our country. It is quite reasonable to apprehend that in near future

a large number of sea water distillation plants would be setup covering the entire coastal line of our country including West Bengal, specially in Sundarbans area. These plants would render significant help for reducing drinking water shortage of our country.

Most probably these schemes, at present, will not be able to draw due attention from the authorities who matter. But in near future, we are pretty sure, when the scarcity of electricity and usable water will be acute, these schemes would bound to be tested and accepted by the appropriate authorities of the Government and well known business organizations of our country.

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T. M. Das Foundation

A few important original contributions

1. For the development of non-conventional energy use
 - I. Consturction of 4 improved Models of low-cost Solar Cookers without mirror (2011).
 - a) Family size for two adults and one child. b) For single person, c) A portable Model that can be carried down to the place of work by daily, workers. d) A Hanging Model for using in hutments (Bustees). All the Four Models can be used as window models for multistoried buildings where facility of roof is not available.
 - II. Construction of an electically operated smokeless close circuit oven.
 - III. Paper energyball. These balls prepared from paper pulp of waste paper release heat energy during burning. It may be developed as one of the items of cottage industry.
 - IV. A scheme for Generation of electricity from the energy of gravitational pull.
 - V. A scheme for distillation of marine water for the large scale production of distilled water as well as drinking water by using concentrated infrared solar radiation as used in Solar Cooker technology.
 - VI. A scheme for distilleation of arsenic contaminated water for production of arsenic free drinking water by using concentrated infrared solar rediation. During the night or rainy or cloudy days the unit could be operated by electricity, (batteries).
2. Revaluation of services of Tree in 2012. First estimation was published in 1979. It was widely circulated and helped to develop a new concept in Social Accounting and Corporate Social Reporting in the discipline of Accountancy. The value of services of an *Aswatha Tree* for 50 years as per revised estimation is Rs. 3.55 crores. *Indian Biologist*, Vol. **44**, No. 1, 2012.
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11. Audio Visual Gitanjali, Bengali and English Version. (2010)
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T. M. Das Foundation for
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A PROFILE OF CREATIVE WORK



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- VCD No. 3** Natural History Museum, Los Angeles: Biological Resources of Pacific Ocean.
- VCD No. 4** The Huntington Library, Art Collections and Botanical gardens, San Marino, Ca: Shakespeare Garden, Bonsai of Japanese garden, World's richest Cactus collections.
- VCD No. 5** Getty Museum, Santa Monica, California: World's most modern and richest Museum with significant collections. Foster Botanical Garden, Hybrid Orchids, Hawaii.

VCD No. 6 রূপসী আগ্নেয় দ্বীপপুঞ্জ হাওয়াই। Sunrise, on Diamond Head volcano, Submarine drive, Waikiki Aquarium. Foster Botanical Garden, Sunset on Pacific Ocean.

VCD No. 7 মোহময়ী আগ্নেয় রূপবতী হাওয়াই। Hawaiian Music, Boat Dance, Fire Dance at Polynesian Culture Centre, Pearl Harbour, World's most valuable Documentary of Pearl Harbour attack by Japanese Bombers on 7.12.1941. Hawaii by night.

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VCD No. 8 Strategy of survival of Ants through 80 million years, Infrared Video Photography of Ants for detection and collection of their dead bodies in total darkness, Capacity of Ants to detect, select and collect food materials.

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VCD No. 20 Exploration of River Ganga Kolkata to Southern stretch

VCD No. 21 ঝরা পাতার গান। ঐন্দ্রিলা। বেদনা ও বিষয়তা ভাবাশ্রয়ী রবীন্দ্রসঙ্গীতের সঙ্কলন।

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Long playing Audio Visual Geetanjali (Song Offerings)

DVD No. 25.3 Rabindranath Tagore
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