‘Water Conservation Irrigation Practices’
For
‘More Produce Out Of Crops’

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Saripalli SuryaNarayana.B.E.,FIE.,FIV.,FIIBE

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Introduction;-We have water bodies everywhere on the continents. Water is the source of life for many lives including plants.Earth estimated to have 1386 million cubic kilometers of water which includes liquid and frozen forms of ground water.This includes seas, oceans, lakes, and streams.

Salt water accounts for 97.5% of total water and the rest 2.5% is fresh water. Of this 2.5% around 68.7% is locked in glaciers and remaining 29.9% or 0.265 of total water is the fresh water on the planet. This renewable energy is the main source for Industries, for drinking and for farming.[17]&[2].**We are on a Planet called earth which itself has life and is supporting all types of biological forms**.

We are yet to come across such a planet in the Universe. These biological forms sometimes turn nature against the humans and produce virus, bacteria and pathogens. Such of these viral attacks can be life threatening and can endanger human lives. The elimination of such is time consuming.

Under increased stress because of population increase we have to find the ways to enhance the food production by using less water .The Idea is to feed the present 7.6 billion population and to the population which might be increasing to around 9 billion by 2050.The necessity is to understand the storage of water and using treated waste and sea water for livelihood,is imminent.The water and oxygen support the plant life. The Agriculture practices in the given area and the soil fertility are important spatial dimensions for plant life.

Water Storage and reuse;-Water availability is assessed in rivers,by conducting gauging.Rail fall is a major source of water in many places across world.The rain gauge stations are established and a polygon system of assessing rain quantum,based on intensity and area are established and correlated with the gauging on the affecting rivers.Where ice melting is a major system of water contribution in to rivers,auto recording gauges help in assessing the quantum.Sensors are a stream which we can not give up in our daily life,including measuring water and classifying its turbidity.

Water is stored in such a way so that the incoming water is diverted across gravity channels by providing a barrage.How ever many places construction of a dam with a

storage pond in back ground is to meet the water requirements in dry seasons.Across all irrigation facilities storage reservoir are created to meet human consumption.Where ground water can meet some basic needs that is extracted by using pumps.

Soils;-The soils in each region or the country could be quite varying and may not be suitable for growing some or the other types of plants, except when it is rocky. But rocky soils offer good foundations for Dams,and some times the aquifers are between two rock layers.The cohesive soils offer a non lined channel for gravity flow of water in irrigation channels.The planet has its soil conditions, it has water coming from aquifer, it has its own trade winds and consequently it has a system of rains in each of the five continents where life is fully supported.Soils confined relatively offer cohesion and serve as good model for oxidation at root zone. The 'surrounding trees' 'around the farming fields' 'confines the soil movement' to a large extent thus offering a relative strength, cohesion and oxidation.

The practice of putting 'Palm Trees'[also called locally Tadi-which absorbs lots of nitrogen at root level] along the long and lengthy borders of the farm or the field area was time tested in the early nineteenth century. Which latter gave way and is diminishing in the cultivated areas across Asia.

The food systems;-We have started using many types of fruits, vegetables, or some seeds. In the process we found some types of grains can be used as main food daily, that is Wheat and Rice now days in half the world. In older systems it was barley, maize and some millets. Sometimes we have left behind some of the crops as we have not felt comfortable with the grains that were in use then. This could be for various reasons including taste, digestion adaptability, availability and versatile and might not be cost effective.The combination of man animal as life support systems is most predominant by virtue of which man is accustomed to the milky cows and or such animal milk.The humans had started to cook and eat several birds.Several Big animal mutton has also started creeping in to food habits,along with the Goats and Sheep.Some of the birds and animals have started finding a place in the farms.Over years fish and other sea foods cooking and eating have increased to meet the dietary requirements of increasing humanity and to match their taste and hunger.So the fish are there in the ponds.

Marketing of grains;-We as a international society have set up market mechanisms for pricing of the grains, seeds etc based on the systems of agriculture and the mechanisms adopted by each country, region and the way the Governments look at its people and the produce. While Human systems wants betterment by productivity, the combination of water, soil and organic matter gives way for production of many pest, worms, and breeds mosquito to a large extent.This is being taken care at many places. When the Barter system prevailed money exchange systems were not known.

Now the money as a medium, with Banking as a system and currency as a product, the agriculture produce is traded across countries on the earth.

Life in earlier years;-People used more of copper vessels for storing water in which some bacteria was eliminated.Lead or an alloy of lead was used to store butter milk.Bronze and its alloy were used for cooking and storing food and water.With the then systems, and no or less technology in communications and travel,and less chances of

mitigating the adverse effects of disasters the generation of that time suffered and still existed.

Irrigation;- The component for irrigation is water which is generally coming from Rain, which is called as precipitation.Water is responsible for civilization and the process it has made possible several cultures, based on the economic growth and enhanced living standards. The slope of the terrain and the changes in basin are most warring limitations on the systems of irrigation and its practices. Human consumption's also subscribe to the change of food habits while making the farmer to have a ecological and seasonal variations in systems of production.

Using Drones and UAV to measure the precipitation;-Rains gauges are established all along the catchment areas and actual daily and yearly statements are obtained for at least 20 years. Now a days we have 50 years records everywhere. In a cycle of 8 years gauging on rivers were conducted to establish dependable rainfall and run off. The flatter the slope of basin the discharge from the river is slow and dependable.The use of unmanned aerial vehicles (UAVs) or drones for management of crops, livestock, fisheries, forests and other natural resource-based activities represents a new technological frontier and opens up a range of exciting opportunities. The latest issue of **ICT Update,** a bi-monthly magazine published by the Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA) is dedicated to the use of this technology and associated systems in different parts of the world. [24].

Crops and pattern;-Irrigation systems prevailed from ancient times but their systems were consistent with the requirements by the societies at large. The kingdoms were small, the towns were modular and the crop requirements were modest in a sense they need to meet the then populations. The mass transport systems were nonexistent then.From 1960-70,the world started seeing the increasing of population from 3 billion to 7.6 billion present day. Wheat is used as a more secure and safe food by many populations while Asian population is relatively dependent on use of Rice.

Green Revolution in India was pioneered by Dr.M.S.Swaminathan by introducing more yielding short tenure rice variety. His research on wheat variety and 'pest resistant' has made the availability of food from 350 million Indians on that day to 1.30 billion today.

Similar systems were adopted done by Norman Ernest Borlaug who was an American biologist and humanitarian who led initiatives worldwide that contributed to the extensive increases in agricultural production termed the Green Revolution.The main development was higher-yielding varieties of wheat, which were developed by many scientists, including American agronomist Dr. Norman Borlaug[1914-2009]. [Wikipedia]

Worldwide cereal yields are expected to decline by 5 percent for a 2 ˚C rise in temperature and by 10 percent for a rise of 4 ˚C. Grain yields should decline above certain temperature thresholds, with grain number in wheat falling in temperatures above 30 ˚C and flowering declining in groundnut when they are above 35 ˚C.Production

precautions are necessary for cereals and for rice and ground nut with these environmental changes.So the consumption and habits also needs a change.We are definitely in to climate changes.If it is not artificial it is natural and the disasters witnessed including the earth quakes and the Hurricanes are terrifying this year.

Protecting Fresh Water Ponds and Aqufiers at Intersection;-Against the confluence of a river does the sea waves have the dynamics of erosion.M**angrove forest** protect the hinder lands. In delta areas of Ganga, Sundri trees are found, which provide durable hard timber. Palm[also called as Tadi], Coconut, also present in many Delta areas, protecting the Estuaries..**Bi**g fruits help in saving hunger, as well sea water can supplement to some trees growth and thus reduce the needs of irrigation. But now a days, Mango, Banana, Cashew nut, Jackfruit, papaya, tress also are transplanted along with betel nut and other leafy creepers in the delta areas.

[ii]Water auditing;-The ground and the surface water resources in each basin has to be monitored monthly, and any fall in levels beyond has to be notified for the farmers. The statutory systems can be devised to regulate beyond certain limits the ground water.There has to be third party audit, with powers bestowed on them for determining the extent to which each river basin ground water can be used.

How best can we modernize and use less water and get better yields.;-Changes in living systems and eating habits have become necessary.Sure the 15 th century did not use our present technology and so the the next generation will not use ours.

Making an equity based **solar power** for all the **tube wells** and c**onnecting the major river basins by using mass pumping schemes to divert surplus or excess rain water to the fields,** and to the reservoirs, dams, and such storage places which enhances the ground water also.Surface water basins inspection and restoration has to be done quarterly.This audit shall comprise of several agencies, including agriculture, irrigation, forest, environments and socially responsible committee.

Controlling the water **out lets of field and branch canals with regulatory valves**, recording extents of **water used in a block and the farm extent** and **changing crop patterns will enhance the local studies and give better knowledge to the farmers**. Use of bio pesticides. Growing trees all along farm bunds to reduce the effect of sun. Stopping haze, vapor in air by stopping sprinkler irrigation systems.**Legal aspects of making audit of water issues with a third party have to be examined.**

Alternate wetting and drying;- Rice feeds more people than any other crop, but each kilogram of rice is responsible for substantially more greenhouse gas (GHG) emissions than other key staple foods. The System of Rice Intensification (SRI) has recently received considerable attention for its ability to increase yields while using less water. Yet so far there has been little research into the GHG emissions associated with SRI production systems, and how they compare to those from conventional flooded-rice production techniques.[13] While the System of Rice Intensification is under studies to assess the GHG emissions, other benefits at large are good produce. The production trends of west Bengal, Assam, Bihar Indicate that almost around 4 tons per hectare is produced with use of around 3200 litres of water per K.G of rice. This is an encouraging sources from where SRI,and ADW policies can take off. Rice [Developing an Action Program for Farm-level Impact in Rice-Wheat Systems of the Indo-Gangetic Plains, and Agricultural Situation in India [2000] and March, 2014 -

Publications of Economic and Statistics department of agriculture and co-operation ministry of GOI.The two publications give water and crop produce statistics, for farm level inputs.]

Most of the world's rice grows in inundated conditions, and one of the most promising techniques for reducing rice-related emissions is to reduce or interrupt the periods of flooding. The production of rice in flooded paddies produces methane because the water blocks oxygen from penetrating the soil, creating conditions conducive for methane-producing bacteria. Shorter flooding intervals and more frequent interruptions of flooding lower bacterial methane production and thus methane emissions.[7].The SRI is tested more in India, while ADW is tried at IRRS at Manila, and worldwide.
The practices have to reach the class room, agriculture research and extension centers and as well the field farmers. The district level co-operatives and the irrigation departments are still not equipped with the understanding.

[1] Changing rice production systems with use of less water.
[a]Changing the dietary requirements of families by reducing 10% rice consumption each day in the first year to 20% reduction in next 10 years.
[b]Use of other millet and fruits as a substitute, may be adding some wheat quantity in daily routine can change the decease routine and or cycle in human body.Changes of crop pattern.
[2]Protect the water sheds by
[a]Planting trees and forests
[b]by developing impounding reservoirs at start and at middle of water basins.Making ground water recharge wells in the basin.
[c]developing proper river bank protection systems
[3]Installing modern rain gauges with perceived systems of rainfall, and integrating and
[a]computing flood discharges in rivers realistically along the 12 month periods.
[b]Employing many lift irrigation schemes to utilize for storage during floods,
[c] storing the water in protected pools, reservoirs and geo-membrane treated water ponds for drinking and other activities.
[4]Using lined or piped channels for flow from barrage and or dams so as to avoid heavy losses at the first stretch of the irrigation systems.
[a]Providing proper soils for embankments in the middle and train or trim the canals yearly for proper flow of water.
[b]End water release shall be with reliable economical by use of plastic/PVC pipes with valves to calibrate.
[c]The system of weekly allotment of water is not followed at many places due to which the tail end even do not receive the drainage water as the drainage system is mostly non functional.
[5]Estuaries at the end of rivers joining the sea are most important sources of marine life for mankind.
[a] Protecting them with mangrove and other coconut, banana, and cashew plantation has to be encouraged.
[b]The aquaculture has to be somewhat interior as any direct interface with sea will be a threat at the time of Tsunami.
[6]The data on Irrigation actually done by each country do not give a real time picture of

the world.
[7] Develop as many water storage reservoirs as possible, check the soils and use geo-membranes and keep water for industry, drinking etc.
[a]Use the water for second crops judiciously..Use the soil water and moisture in weather and two or three wetting by drip irrigation are sufficient.
[b]Just discourage sprinkler irrigation in these parts due to temperatures.water becomes vapor quickly and creates more problems of haze in summer.
[8]The economics of the farmer is as much needed as that of the nation,just encourage solar power with one time installation cost and maintenance by communities for farming, irrigation etc.
Encourage to plant trees that reduce sunlight on to the fields in cropping time,the directions have to be worked out at fields and the types of tress shall sustain other oxidants and absorb the nitrogen.Use always deficit irrigation,solar power for all purposes,and use only drip irrigation.

Save water-save human live,enrich families

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Chennai and Tamil Nadu - On 28–29 November, another system developed and arrived over Tamil Nadu on 30 November, bringing additional rain and flooding. The system dropped 490 mm of rainfall at Tambaram in 24 hours starting 8:30 am on 1 December. Very heavy rains led to flooding across the entire stretch of coast from Chennai to Cuddalore.
[20]07:03 PM (IST), Sep 25-change? With another depression forming in west-central Bay of Bengal, the Indian Meteorological Department has said Hyderabad is will have to brace for five more days of rain, before a lull for some time.News reports-about 24 cm rain in 24 hours in a day.
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[22]Dr. Robert McDonald is Lead Scientist for the Global Cities program at The Nature Conservancy. He researches the impact and dependences of cities on the natural world, and help direct the science behind much of the Conservancy's urban conservation work. More from Rob
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Rice Crop in OCTOBER2016 at North Coastal Andhra,Vizianagram,with deficit irrigation.

Rice Crop Under a Pond,with principles of Deficit Irrigation.

Closer look at crop yield of rice,where assured irrigation is very partial.

Saripalli SuryaNarayana.B.E.,FIE.,FIV.,FIIBE
India,Life Member-FIV-5889.,Indian Institute of Bridge Engineers.,IIBE-1718,
FIE[Institution Of Engineers-India].Member Indian Concrete Institute, India, LM-2896,
E-Mail-s_n_surya@yahoo.com,suryasn.saripalli@gmail.com
Twitter-@saripallisn,https://www.habitat3.org/user/89155

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