Climate Change and Impact on Water Resources: A Perspective To Review The Environment: Applicable To Udyavara River Basin Westcoast of India

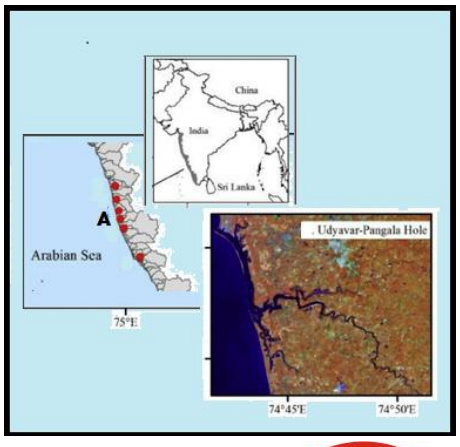
Balakrishna Srinivas Maddodi, H N Udayashankar

Abstract: ***Climate change is always a continuing and extensive behavior of nature that is observed in any weather condition of any distinctive temperature. For a stable ecosystem and for a well-established flow of river and water resource is very much essential. For a stable health and to keep a constant health a clean drinking water supply is more essential to the community. Water is the most essential resource required for the growth of agriculture, production of energy, water source navigation, recreations and for manufacturing units. Whenever there is an increase in demand on water supply climate change have shown a positive trend and its impact is upturn. Climate change and its impact have shown a direct trend on water availability. Water scarcity on this earth show a negative trend on the environment and in turn has a direct impact on ecosystem change. Research show that by end of this century, the development in climate change will result for global warming, which has been escalated to 1.2°C to 1.5°C, and the fresh water resources has moved towards the negative trend and has contributed to the declined growth of agriculture crop. Research publications shows that about 75% of the glaciers in Himalayan are in clearing stage, and are expected to be away from this earth by the end of 2035. are likely to vanish by 2035 or before. Date available inform that Africa is under menace for surface water and the rainfall which may drop by 10% or more by the end of 2035. This will result in the shrink of the river system by not less than 17%. Most of the stream adjoining the river belongings has been sapped and drop in the yield worldwide has hastened the people. Protuberant change in climate is growing and the landform are converted into deserts and the world is going to see the floods and droughts with increase magnitude. With this study the climate change in micro and marco level will highlight the impact on Udyavara river basin also. Similar studies on land use and land cover using GIS and RS techniques will highlight the present setting and the change that may take place on development. Evaluations of the Udyavara ecosystem would define the impact of the anthropogenic activity which will influence the sustainability of the estuarine environment.***

Keywords: Climate change, Water security, Water supply, Water demand

I. INTRODUCTION

Water, energy, agriculture and climate have a close interrelation and play a key role in the human life. It is a significant to know the water cycle and the different stages in which water cycle complete. If we see the present status of the water relationship with other variables the relationship is dwindling out of poise, threatening the food, water and energy security of the ecosystem. Decline in the correlation of the Climate, there are lot of variation which has affected water resources through its control on the capacity, inconsistency, effectiveness, practice, and also in the passion of rainfall. Decrease in availability of water, which is the most essential, is expected to be a endless problems in this biosphere. The research data available from the world data base clearly show the irregular distribution of rainfall in terrestrial and period of precipitation is also uneven, which leads to farfetched chronological changeability in "water resources worldwide (Oki et al, 2006)". The dehydrated area today in desert of Chile, receives unnoticeable annual quantities of rainfall every year. Mawsynram in Assam (India), receive over 1500 to 1700 cm every year. The evaporation rate differs in a excessive transaction, directly depending on humidity and temperature. This has a direct impact on the amount of water which restrict the groundwater supplies. We have done an attempt to provide a summation on the physical and profitable effects of climate variation on water capitals. The Udyavara river basin is located Udupi, District, West Coast of Karnataka State India. The area investigated, is accounted for in the survey of India Maps, 48 K/11, 12, 15, 16. 48 0/4. The basin spans an area of four hundred and twenty-two square kms. The basin spans an area of four hundred and twenty-two sq. kms. The perimeter of the basin is defined by the Tunga basin (Mysore Plateau) to the east, the Arabian Sea to the west, Sita-Swarna Basin to the north end and the Mulki Hole to the south. The area is accessible by the National Highway No. 17, (Mumbai-Cochin) from Mangalore and also accessible by the Konkan Railway.



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Balakrishna Srinivas Maddodi, Dept. of Civil Engineering, Manipal Institute of Technology, MAHE-MANIPAL, India

Dr. H N Udayashankar, Dept. of Civil Engineering, Manipal Institute of Technology, MAHE-MANIPAL, India

II. CLIMATE CHANGE PATTERN:

Research work has proved the warmest temp in both hemispheres even includes ocean surface and land temperature in recent past. The highest temperature was enhanced and there was a slender decline took place in arctic sea ice level. Greenland, Antarctic ice sheets had a great loss of net mass from the world's glaciers. About 3mm per year was the rise in mean seal level which is an evidence for the melting of ice and extension of heat in sea water. Today the Sea level around the world was around 200 mm which is highest than the level in 1880. Result also showed that no major EI Niño event took place between 2001 and 2010, which usually primes to higher temperatures, as observed in the year 1998 which show the as record warm year. Study show the decade experienced cooling El Niña conditions, other than 2009 and 2010 reasonable stout El Niño.

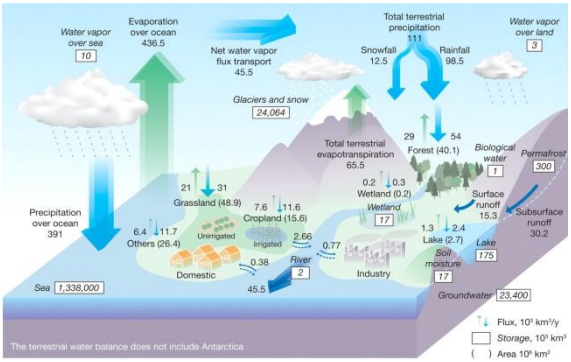


Fig. 1 Hydrogeological Cycle – Precipitation to Evaporation and Condensation process of water cycle

Source:
http://science.sciencemag.org/content/313/5790/1068

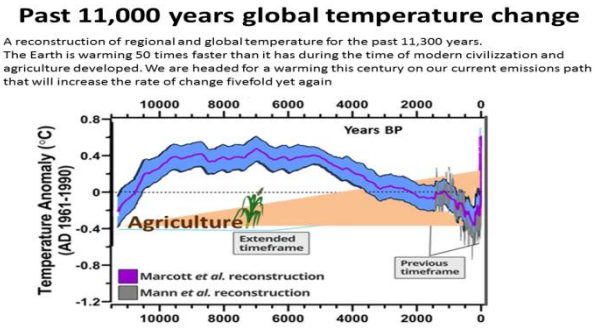
Temperatures: Research data record of the land and ocean surface available from 2001 to 2010 show the average temperature of 14.47°C. The global average temperature for 1961–1990 was 0.47 °C and around +0.21°C and above from 1991–2000 worldwide.

Precipitation and floods: After 1901 the second wettest year was recorded in 2001-2010. Beside 2010 was recorded as the wettest year, some wettest record also lies with Europe (East) in the year 2001 and 2005. The wettest year is also recorded in India in year 2005, Africa in 2008, whole Asia in the year 2010 and Australia in 2010.

Tropical cyclones: records available show more the 500 and more tropical cyclones like disaster which took place between 2001 and 2010. There was a huge loose on property and human casualty, nearly about 170,000 people's life was destroyed. Over two hundred million people stated unnatural and projected financial compensations of more the five hundred million dollars by the government and statutory bodies.

Impacts: According to the details available at the "Centre for Research on the Epidemiology of Disasters" (CRED) from 2001 to 2010, it shows near four lakh people breath their last. The death was due to the strong heat waves, dry drought, extreme storm and flood and unexpected weather and climatic condition. The record also shows an increase of

20% higher than the year 1991 to 2000. The casualty and damage is due to extreme heat wave in Europe and Russian in the year 2003 and the 2010 respectively. 200% increase in the death rate was recorded due to extreme heatwaves which contributed to an increase of more compared to less than 6000 people in 1991-2000 to 136 000 people in 2001-2010.



Source:
https://www.climateemergencyinstitute.com/climate_history.html

Fig. 2 Global Temperature change from past 11,000 years

Udyavara river basin analysis based on Temperature, Humidity, Rainfall, Geolgy and geomorphology stretch a caution on the sensitivity of Udyavara river basin. This has been proved by many work done by the scientist on similar basins like Udyavara River Basin. Based on the Murphy (1968) system of landforms classification, the landforms of Udyavara Basin may be symbolized as GPH (Plain area in Gondwana shield regions with humid land areas). The Udyavara basin lies between N200 and S200 Latitudinal zone and thus, enjoys a tropical wet-dry climate. The basin is marked by heavy rainfall, high humidity and small variation in temperature. In contrast to the Mysore Plateau the Western Ghats are characterized by intense rainfall, towering humidity and marked variation in temperature at different seasons.

The Physiography of the basin from coast and beyond to the Western Ghats profoundly influences the climate, particularly the distribution of rainfall. The Western Ghats scrap and ridges further east act as a climate divide between the coastal tract in the west and plateau region above the Ghats in the west.

There are two meteorological stations in the basin to record temperature, humidity, wind and evaporation. The nearest recording stations from temperature are located at Panambur and Bajpe. The Bajpe station is located about 8 km away from the Shore, whereas Panambur station is located close to the shore. There are few rain gwage stations in and around the Udyavara Basin. The basic data can be obtained from the office, District statistical office Mangalore.

The temperature record shows the day temperature will be around 200 C during the Month of July to September. December and January are low temperature Months (night). In general, the temperature decreases with the onset of the South West monsoon. The annual mean maximum temperature is around 300 C at Bajpe and 32.90 C at Panambur.

Rainfall is the most important exogenic process in shaping the landforms. The alignment of the hills, ridges and scarps with respect to prevailing winds and their elevation profoundly influences the distribution of rainfall along the west coast. The western margin of India, heavy rainfall occurs along the scraps of the Western Ghats, on the windward side of the Ghats, the rainfall is as high as 600 cm, but with about 80 km to the leeward if profoundly decreases to about 59-60 cm.

The coastal tract of Karnataka has a good network of rain gauge stations. The rainfall data for 50 years suggest an average rainfall of 123 rainy days per year and an average annual rainfall of 340-440 cm. About 80 percent of the annual rainfall is recorded during the south west monsoon season (June to Mid-September)

III. EFFECT OF CLIMATE CHANGES ON WATER AND ITS RESOURCES:

Water cycle and Water Demand:

The research shows a drastic change in hydrological cycle due to change in temperature and increased greenhouse gases in the atmosphere has given rise to series of impact on earth -

- Variation in seasonal distribution and amount of precipitation.
- Underneath most situations intensification in precipitation intensity
- Radical change in stability of snow and rainfall
- Rise in evaporation and evapotranspiration and loose of moisture in soil
- Continuous change in green cover causing direct impact on global temperature and precipitation.
- Resulting financial transaction in association of land capitals.
- Rapid melting of ice
- Threat of fire and its risk in various parts of the world
- Amplified coastal flood and loss of wetland
- Plant physiology and condensed transpiration with effectiveness of water usage caused by CO2

Fluctuation trend- Rainfall and Drought configurations:

Increase in rainfall will also increase a province's vulnerability to a variety of factors, counting with:

- Submerging of land
- Removal of top soil i.e. Soil Erosion
- Land slide or Land degradation
- Availability of Wetland

Melting Glacial Ice:

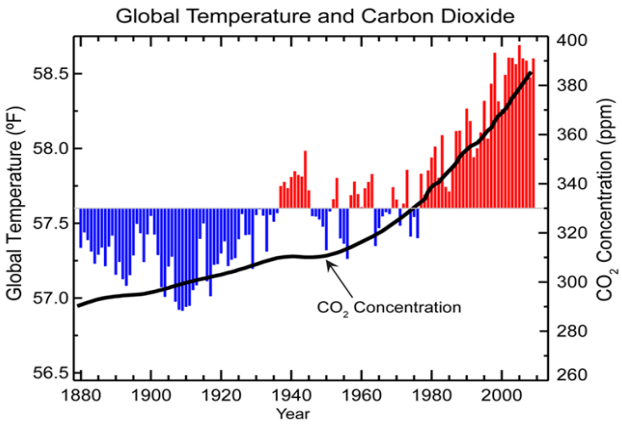
Winter temperature will cause a decrease in the volume of snow pack which will affect the Water supplies which has moderated water resources specially in summer. At the mid-latitudes and in mountainous regions water supply is particularly in melting of ice water throughout the summer months, trailed by a reduction in melting as the size of glaciers continue to contract.

Fig 3. Source: https:// inside climate news. org/ news/ 20090506/bolivias-chacaltaya-glacier-melts-nothing-6-years-early

The decline in glacial runoff water is predictable to distress around one-sixth of the world's population. For example, as observed in the Andes there is a reduction of glacial runoff, whereby the natural tendency of glacial replacement during winter months has been inadequate.

IV. IMPACTS ON WATER QUALITY:

Watersheds have an inadequate ability to check the contamination stanching as of growing municipal, business and unindustrialized practices. Major sources in scarcity of water is due to water quality degradation. Deterioration in purity of water end through the increase in surface overflow and precipitation. When water flow from higher levels they carry particulates, it will encompass of new biological components of pathogens and toxins. The impure contents which are stored in groundwater stashes as the growth will dazzle and drive to blush in liquidated water. Increase in water temperature will be the most significant source of water dilapidation. Upsurge in water temperature will lead towards the flush in bacteriological inhabitants and always create a damaging element in health of all human being. Moreover, water infection rate poorly disturbs diverse dwellers of the surrounding due to a different kinds of concern towards temperature. Always, the fact is wherever the river is reliant on its ability to effectively self-purify through biodegradation then the delay will have reduced the amount of amount of dissolved oxygen which defines the health of a body of water,



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V. RESULTS

Location		Physics Parameters		Chemics Parameters				
		Water Sample						
		Temp. (ºC)	**Turbidity NTU**	**DO (mg/L)**	**PH level**	**Hardness (mg/L)**	**TDS**	**Conductivity**
Kemmannu	L1	22.5	10.5	6.5	6.5	1015.63	3.301ppt	5.834mS
Malpe	L2	22.5	7.6	7.1	6.8	601.56	2.207ppt	3.373mS
Katpadi	L3	22.5	51.2	7.0	6.4	80.08	247.9ppm	445.1uS
Udyavara	L4	22.5	5.0	6.8	6.7	50.78	117.9ppm	243.1 uS
Pitrodi	L5	22.5	10.2	6.5	6.7	687.50	2.359ppt	4.859mS
Mattu	L6	22.5	7.9	5.8	6.5	117.19	502.8ppm	770.1uS
Pangala	L7	22.0	4.7	7.7	7.0	42.97	76.83ppm	167.3uS

There was no significant change in the pH value throughout the Udyavara estuary: the observed values were in the range 6.4 to 7.0. There was not found any pattern for any parameters. However, Pangala shows be the station with the best results, whether in the physical parameters, either in chemical parameters. Pangala station has the lowest level for turbidity, hardness, TDS, conductivity and chlorides and the highest levels for DO, pH. One of the reasons to explain these results is because of the distance between this station (L7) and pollution sources. This may be the justification for the first three locations presenting the worst results, Kemmannu, Malpe and Katpadi. Any ecosystem needs time to recover from the damage caused by anthropogenic activities. This case is no different and so that harmful activities to the estuary and its associated ecosystems (i.e. mangroves) to stop, whole system will recover.

Properties on Inhabitants of Coastal region.

Quality of water is likely to be pretentious by salinity. The improved extents of the present salt in water, deliver predominantly a dynamic hinge on coastal populations, which results on rise in main sea levels. This will also allow to increase the salt water enrichment in groundwater and special in marine region of creeks. Sea-level rise will not only extend areas of salinity, but will also decrease freshwater availability in coastal zones. Growing coastal populations has resulted with increased demand which resulted in saline intrusion. The groundwater reserves in increasing trend always behaves susceptible to the contamination and shrinking of water reserves. Intrusion of salinity has resulted with increase in demand due in part to –

Some other effects:

- Stream flow reduction
- Intrusion Salt water
- Increase in Evaporation rates
- Larger storm flows / Extraordinary sea levels
- Damaged environmental/biological groups
- Economic imbalance (Commercial and sport fisheries, tourism, industrial capacity)

Assistance and Remedies: Assuming Personal Responsibility

Take responsibility to check and reduce our own carbon footprint to the environment. Bring a strong group of policymakers and technologists to fetch the professionals and consumers' responsiveness of using energy efficient technics and technology behind it. The energy efficient technology will meet the requirement of clean technologies, were mass transit substance are used.

Investor and consumer should be alert and tech savvy matured environmental friendly citizen. When new product, is launched the review and river Climate Counts Company Scorecard, which evaluates companies based on their efforts to address and mitigate negative environmental impact. Go with a hybrid car both in personal and official use. Electricity, gasoline and hybrid combination run are much more effectual than any conventional vehicles. Efficiency of carbon dioxide emissions and other pollutants can refine the green used in electricity used both at home and office. Matured usage of electronic appliances and keep it off when not in use. (i.e. illuminations, mobile phone chargers, electronic gadgets, etc.). Switching of computer on standby

On purchase of the New appliances like lighting, electronics, office equipment and other products take a look on how -

- To avoid machine drier and rather use air drier in laundries
- CFLs bulbs show the utility of bulbs which use 75% less energy and last 10 times longer other than conventional luminous light-bulbs
- To be dependent on public transportation system and subways for short or long trips; leaving back own cars
- Search for the recycled materials in your area to give distinctive care on SWM and 3Rs
- Burning bio-wax fire logs, emits 70 percent less carbon other than firewood and 80% less than natural gas.
- Reject bottle water and start using tap water to drink. This will reduce buying bottled water and handle plastic and its problems especially in western countries like North America and Europe.
- Say not to taste or additives and start using home filtration systems which are a more efficient and economical
- In order to breakdown the massive carbon discharges, transporting food buying can be eluded and purchase local food and support local products.

VI. CONCLUSION:

The effect of climate change and water resources have seen its place throughout the world. Arid and semiarid areas depend on rainfall and river flow throughout the year. Drainage flow origin in humid and pleasant regions where the source for stream formation take place. Increase in water stress has due to climate change worldwide and a strident failure in precipitation which is anticipated in these regions. Research in these area predict a sharp fall in regularity and growth in the dynamism of rainfall, resulting in unexpected permanent drought and floods in these region. Indefensible reduction of infiltration will reduce groundwater supply and will likely be go out of hand by decrease in surface water infiltration in these areas and will result for the intrusion of salt water and extensively to the coastal aquifers.

This process will reduce the availability of usable groundwater for future generation. Udyavara river basin is also not away from these change that the world is going through. Hence the study on Udyavara River basin will help the authority to take decision on the development of Udupi and Surrounding on sustainable development. Water resource will play an important role for a healthy development of the smart city as planned by the government. As the Udyavara river basin more sensitive when observed on its slope, geology, rainfall, temperature, land use and land cover it is on the administration to monitor and have a check on the development activity. The output of this paper strongly recommend the subsequent action plan which may minimize the control of climate change on water resources especially in coastal environment:

- Regions which are most vulnerable to climate change, should adapt strategies to manage climate change risk.
- Economic feasible techniques and easily operated toll to eb formed to meet the coming demands.
- Depending on their hydrological conditions the strategies are built and they will be different
- Strongly recommend by the baseline data collection related to water and water management and institution should encourage and finance for research project especially by countries with arid and semi-arid regions
- Awareness workshops on groundwater development, watershed running projects like rainwater harvesting, watershed management, formation of artificial recharge facilities with wastewater and rainwater should be instigated on a large scale so as to put all undeveloped water capturing areas to a watershed locality.
- Arid and semi-arid countries can implement and the waste water treatment plant can be used where the technique has proven with recharge advantages over the direct application of treated wastewater.
- Strong implementation on waste water treatment plants to be done so that artificial recharge of groundwater will add an advantage to reframe the water policies in all semi-arid and arid countries. In return the wastewater treatment is a proven technique to handle recharge of ground water.
- Increasing the awareness with discussions with students, business groups, corporates and communities through conferences can be done by Hydrologist and earth scientists.
- Reducing the dominance of climate change can bring a strong public image and awareness and involving them on water management issues sill solve the Global warming which is a world problem now.
- Role of Geologist, Hydrologist and Engineers is more responsible in bringing the awareness and take this problem as global issue and involve students, business magnets, corporates and communities though a mass movement
- Understanding on problems and involving without any expectation and give a right solution for global warming and water resources.

VII. ACKNOWLEDGMENT:

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