International Journal of Applied Research 2017; 3(1): 710-716

ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2017; 3(1): 710-716
www.allresearchjournal.com
Received: 05-11-2016
Accepted: 06-12-2016

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Climate change and Manipur: Preparations, problems and awareness to face it

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Abstract
Climate change in recent decades is a global phenomenon arising out of human activities due to disturbance in the natural balance of greenhouse gases which maintains the temperature of earth at a normal habitable level. It is unfortunate that human activities have been making the blanket of greenhouse gas thicker, resulting in enhanced greenhouse effect. Carbon emissions from fossil fuels such as coal, gas and oil burnings in factories, power stations and industries have been increasing from about 1600 million tones of CO_2 in 1950 to 6000 million tonnes in 2000. The resulting thickness has disturbed the global climate system resulting in global warming and drastic changes in food production, distribution of mineral wealth, availability of drinking water and forest yields have been forecasted. It also would affect the health, agriculture, forest and bio-diversity sectors to a great extent. Floods, draughts, famine, species extinction, rise in sea level, sinking of low lying areas are projected.
Climate change being a global phenomenon requires global efforts to control it. Manipur as a unit in line with the national objectives has prepared a state action plan to face it. Already the changing trends in temperature, humidity, rainfall have been found out and projected outcomes had already been calculated. The problem areas have been identified and an institutional mechanism had been set up with concerned ministers and top bureaucrats of the government. Besides the general problems of population growth, urbanization, industrialization, deforestation, elevation of lakes, lacunae in the administration of laws, it is felt that there is lack of awareness. It is the role of media to create a public perception to control the climate change by limiting his activities that are harmful to the environment and by doing environment friendly activities.

Keywords: Awareness, climate change, greenhouse gas emission, Manipur, media

Introduction
Climate change in IPCC usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. (Climate Change 2007, Synthesis Report, p.30) [1].
Climate change is a global phenomenon to the extent that changes in the atmosphere, the seasonal rainfall and its effect cannot be limited/ confined to a single place or country. The wind, the rain, and the sunlight do not know man made boundaries. Man out of his own activities, necessity or wild-full acts, has disturbed the natural endowments of the environment and has caused manipulation in the composition of the natural constituents to such an extent that the natural process is reacted to undergo a change as a consequence of which man has to face the wrath of nature i.e. the climate change/global warming.
On this planet earth, different climatic conditions prevail because of zonal variations and variations in the climate of different places in the same zonal areas because of different geographical features and anthropogenic reasons. Man can hardly escape from the evil effects of climate change or global warming out of the Greenhouse Effect and Ozone depletion. However, man can, to a great extent, control his own activities which are the main causes of the climate change, by not doing what is hazardous to the environment, by limiting

his dependence on machines run by fossil fuels, by using eco-friendly products and by maintaining the ecosystem and environment and by developing new environment friendly technologies. In this way, if people or citizens are aware or prepared for protection from climate change or made aware of the evil effects of climate change and thus make them behave accordingly, we can protect the world from its drawing nearer to doomsday.

Climate change may alter the distribution and quality of natural resources and adversely affect the livelihood of people. With an economy closely linked to its natural resource base and climatically sensitive sectors, India may face a major threat because of the changes in climate. It is projected that there would be increasing scarcity of water, reduction in yields of forest biomass, and increased risk to human health**.** The contribution of India to the cumulative global emission is only 6% according to the US Environment Protection Agency. However, India has to share the same fate of global climate change as a cumulative effect of what the other nations have done. It requires a global effort to face the global climate change.

How climate change is caused

Before going deeper into the general issues of climate change, impact on different sectors, state preparations to face climate change, problems in facing climate change in Manipur, measures to take up environment friendly activities and role of media in creating awareness about climate change, it is necessary to have a basic knowledge about climate change and its consequences.

The carbon dioxide, water vapour and methane form a blanket of gases that does not allow the solar radiation to escape back into the space. This blanket functions like the glass windows of a motor car that allows the sunlight to pass through but prevents the heat from being reradiated in outer space. It results into warming of the earth's surface. This is the greenhouse effect. This natural greenhouse effect is essential to maintain the temperature of earth at a normal habitable level.

"Besides CO_2, CH_4 and water vapours, nitrous oxide (N_2O) and chlorofluorocarbons (CFCs) also absorb solar radiation. These five gases are called major greenhouse gases because they act like a blanket spread over the earth's surface helping it to keep warm. These gases occur in minute quantities in the atmosphere as nitrogen and oxygen already occupy 78% and 20.9% by volume respectively. It also plays a critical role in maintaining the balance of temperatures on earth." (Sharma P.D., 2015, p.432) [2]. Carbon dioxide from fossil fuels and industrial processes and forestry and other land use account for 65% and 11% of the total greenhouse gas (GHGs) emissions, respectively whereas methane, nitrous oxide and fluorinated gases (F-gases) account for 16%, 6% and 2% of the total GHG emissions respectively. (Global greenhouse gas emission data, USEPA)

It is unfortunate that human activity has been making the blanket of greenhouse gases thicker, resulting in enhanced greenhouse effect. Throughout the world, carbon emissions from fossil fuels such as coal, gas and oil burnings in factories, power stations and industries have been increasing unusually. From about 1,600 million tonnes of CO_2 in 1950, it has increased to about 6000 million tonnes in 2000. The increasing thickness has disturbed the global climate system resulting in it getting warmer and warmer each year. (Sharma P.D., 2015, p. 433) [2] The industrial activities that our modern civilization depends upon have raised atmospheric carbon dioxide levels from 280 parts per million to 400 parts per million in the last 150 years. (NASA, climate change and global warming)

Consequences of climate change

Climate Change has become one of the major concerns threatening the sustainability of the world's environment and human habitability. There will be marked changes in various sectors such as agriculture, health, biodiversity, forestry etc. including living conditions, birth and extinction of species. Global attention has been drawn by IPCC towards the following (Sharma P.D. 2015, p. 433-434) [2]:

- Concentration of Carbon dioxide, methane and nitrous oxide, because of the use of fossil fuels, have been increased. Carbon dioxide concentration will reach 550 ppm by the end of 21st century.
- Global mean surface air temperature has increased between 03-0.6 °Celsius during later half of 20th century. As per IPCC estimates global mean surface temperature would be about 2 °Celsius above pre-industrial levels by the year 2030.
- There will be drastic changes in weather patterns, bringing more floods or droughts in some areas.
- Forests may disappear. Biological diversity may reduce, some species could become extinct.
- Some ecosystems may not reach to stable equilibrium for several countries, especially coral reefs that are highly sensitive to climate change
- Billions of people will be affected by problems of drinking water supply, sanitation ad droughts
- Crop yields will fluctuate. Though overall global agricultural production may not change, there will be large regional differences. Tropics and sub-tropics may face problems of decreased food production. Negative impacts will be more on developing countries of semi arid zones.
- Sea level is projected to rise between 9 cm and 29 cm by 2030 and 96 cm by 2090. The South-Asian region with over 1/6th of the world population will suffer greatly.
- The warming would cause significant loss of life. Heat stress mortality and disease could increase due to northward expansion of insect habitats.

Climate change in Manipur

Manipur is the easternmost state of India, lying at latitude in between 23° 83′N-25°68′N and at longitude in between 93°03′E-94°78′E, bordering Nagaland in the north, Mizoram in the south, Assam in the west and sharing the international border with Myanmar in the east having an area of 22,347 sq.km.(i.e. 8,678 sq. miles). It has a favorable climatic condition, not so hot in summer nor so cold in winter. The total geographical area of the state is 22,327 sq.km, of which approximately 90% is hilly areas covered with evergreen forests. The state has a population of about 28.56 Lakhs according to census 2011. The population density is 128 per sq km as per census 2011.

1. Factors that Influence the Climate of Manipur

The climatic conditions of Manipur largely depend on the following factors:

(a) Geographic/Natural features of Manipur such as terrain diversity, altitudinal variation, windward position of the area and lake and river regime and natural endowment of environment.
(b) Anthropogenic climate change due to human activities in different sectors like industrialization, extensive urbanization, explosive growth of population, deforestation/degradation of forests, increasing emissions of fossil fuel, waste disposal etc.
(c) Effect of seasonal winds, the North-East monsoon and the South -West monsoon. The North East monsoon commonly known as the winter monsoon blows from land to sea whereas the South West monsoon known as the summer monsoon blows from sea to land after crossing the Indian Ocean, the Arabian sea and the Bay of Bengal.

2. Indications of Increasing Climate Variabilities

Considering the anthropogenic factors of climate change and accounting the present trend of increasing temperature, rainfall and humidity level, scientists have made out future climate change projections over Manipur. As per Manipur State Action Plan on Climate Change 2013, published by the Directorate of Environment, Govt. of Manipur, some of the relevant facts are as follows:

The Present Trend of Temperature, Rainfall & Humidity

Temperature Variability Trend: Manipur is susceptible to anthropogenic climate change showing an increasing trend in both the maximum and minimum temperatures from 26.8 °C to 27. 3 °C in maximum while in minimum temperature from 13.8 °C to 15.3 °C as the effect of the greenhouse gas acting as a glass house by trapping long wave radiation radiated by the earth surface. And the night temperature rises rapidly as compared to day time temperature. It is also evident the hot season is now becoming longer than the cold season.

Rainfall Variability Trend: Annual rainfall quantum varies from 956.5 to 2269.9 mm. And the average monthly total rainfall has varied from 12.2 mm (January) to 407.3 mm (July). And the period of raining days in Manipur has extended from monsoon month i.e June-October to pre-monsoon months like April and May. Few districts of central and southern Manipur experienced a marginal decrease in precipitation over Imphal (East & West), Bishenpur, Thoubal, Tamenglong, Jiribam and Chandel in the last 100 years whereas the northern districts of Manipur i.e Senapati and Ukhrul has observed a considerable increase in precipitation.

Humidity Variability Trend: Relative humidity (RH) in the state is on the rise during the night time especially during June to December due to continuous rainfall causing a great loss in the proper harvesting of paddy in the months-October to November. High rate of humidity and increase temperature are favorable for mosquitoes and vector borne diseases like malaria, dengue etc. Average relative humidity (RH) in the state was 74.22% during 1969 to 2011. It has now reached above 80% during the night time.

3. Climate Change Projections over Manipur

For this report of climate change projection, the following findings from Manipur State Action Plan on Climate Change (p.19-20) have been referred.

Projected Change in Temperature

- The state is projected to experience an increase in temperature above 1.7 °C.
- The projected increase in annual average temperature for the southern districts are higher than he northern districts
- The westernmost district and Imphal West is projected to experience the highest increase in temperature, i.e. 1.8 °C and
- The northern part of the state is projected to have lower increase in average temperature compared to the southern part of the state.

Projected Change in Precipitation Quantum

- The entire state of Manipur is projected to receive increased precipitation.
- The northern parts of the state are projected to experience an increase of ≥19% of rainfall. These roughly correlate with observed trends over the last ten years. The districts of Tamenglong and Senapati are projected to experience an increase in precipitation of ≥21%
- The southern districts experience an increase in precipitation of ≥15%".

4. Manipur State Action Plan on Climate Change:

A. Preparations

In line with the National Action Plan on climate change (NAPCC) in June 2000, the Directorate of Environment, Government of Manipur as nodal agency, in collaboration with 20 line Govt. Departments/agencies of Manipur Govt. has prepared the Manipur State Action Plan on Climate Change(SAPCC) with the objective 'To develop a state action plan on climate change in Manipur based on the recommendation of the National Action plan on climate change for sustainable environment management including adaptation and mitigation of the climate variable.'

B. Institutional Mechanism

Govt. of Manipur has put in place a comprehensive structure to deal with the threats and challenges posed by the climate change. Three committees have been constituted during Nov 2010 and April 2011. The Committees are:

(i) State Level Advisory Committee on Climate Change (SLACCC) with the Chief Minister as chairman, and concerned Ministers. M.L.A.s and other representatives, for different roles and responsibilities, as to approve policies and strategies and follow up on decisions.
(ii) State Level Steering Committee on Climate Change (SLSCCC) with the State Chief Secretary as Chairman and concerned line departments as to follow policy decision, coordinating the implementation, evaluation, audit etc.
(iii) Sectoral Working Group committee (SWGCC). For preparation of state action plan on climate change.

C. Strategies to Tackle the Impact of Climate Change

It continues to point out some of the strategies of the mission which are as follows:

a) Institutional Framework: Development of an institutional network system on regional Climate Change Science knowledge to act as the repository of knowledge about the sectoral demands and needs. This will serve as an effective mechanism for data sharing amongst the climate researchers. Moreover, the network will play watch dog role during implementation and monitoring of the identified action plan for all he mission.
b) Vulnerability and potential as criteria for Intervention: Criteria for selection of projects areas for all the identified Missions will include projected vulnerability to climate change, potential areas for enhancing carbon sinks (mitigate Green House Gas emission) and significance of the area from ecosystem service angle.
c) Robust and effective monitoring mechanism: The proposed institutional network will also help during the implementation of the identified action plan for all the mission and monitoring mechanism will frame four different levels.

5. Major Sectors of the Impact of Climate Change

A. Impact of Climate Change on Agriculture

Agriculture is the sector that would be affected most by Climate Change. Agriculture is totally dependent on climatic conditions such as yearly rainfall, humidity, precipitation, sunlight, heat and dryness. No agricultural product is possible without water or rainfall. Draughts, floods, extreme heat, extreme coldness, heavy rainfall, cyclones are not favourable conditions of agriculture. International penal on climate change and many other agro-scientists have predicted 10-40% loss in crop production by the end of 21st century due to anthropogenic climate change.

"As per the study by the IISc Bangalore rice yield is projected to decrease in seven out of nine districts of Manipur viz Chandel and Thoubal by 3% and between 04 to 01% in Imphal (East &West, Senapati, Ukhrul and Tamenglong by the year 2050". Generally, decrease in production, crop failure due to high rainfall, and occurrence of late monsoon are forecasted. It poses a threat in captive fisheries and aquaculture.

B. Impact of Climate Change on Health

The climatic variability in terms of rise in the average rate of surface temperature and changes in precipitation pattern are likely to enhance incidence of infectious diseases and increase in vector borne diseases such as Malaria, Japanese Encephalitis, Dengue, Chicken Guinea, Kala-azar etc. in equatorial and tropical regions. The vector borne diseases are highly influenced by the weather variability. The situation is equally grave for waterborne diseases like diarrhoea. Heat strokes and associated mortality rate will be high.

In the year 2010, there had been 947 cases of Malaria of which 4 had died; 7 cases of Dengue; 118 Cases of Japanese encephalitis. number of death -16; against 1194 cases of Malaria, number of death-5; 5 cases of Dengue, number of death-1; 65 cases of Japanese encephalitis, in the year 2007. Tamenglong was the worst hit district with 42 Malaria patients in 2011 followed by Churachandpur with 24 Malaria patients. Imphal East has the lowest record with 5 Malaria patients.

C. Impact of Climate Change on Forest

As per an analysis carried out by Indian Network for Climate Change Assessment (INCCA) under the sponsorship of Ministry of Environment and Forests, Government of India, about 8% of forested grids are projected to undergo changes under the projected climate change scenario with possibilities of shifting forest boundaries. Under the change circumstances with the change of climatic condition, there is every possibility of forest areas to become wasteland like situation and reasons for extinction of certain species unable to cope with the changing climatic condition. However, the forest has to be conserved as it is not only a biodiversity hotspot but also it serves as a carbon sink to reduce green house gas effect. As per a study carried out by Indian Institute of Science, Bangalore, no change is projected in the forest type within a short time up-to 2030s but districts like Bishnupur, Churachandpur, Senapati, Imphal East, Tamenglong and Chandel are likely to have high composite forest vulnerability index. The forest ecosystem might be vulnerable on account of the altitudinal and latitudinal shift of the species of the forest ecosystem on account of increased occurrence of forest fire, diseases, and invasive species.

D. Impact of Climate Change on Bio-Diversity

The impact of climate change is likely to affect the natural ecosystem of state in different ways. It will have a profound impact on the time of flowering, reproduction and harvesting season. There is probability of reduction of yield like rice and potatoes because of high rainfall, floods and draughts. As some of the species are likely to be extinct, it will disturb the food chain system resulting in the loss of some another species living on those species. The livestock and animal husbandry sector will be affected. Fishery and aquaculture will be impacted by the changing/rising level of water, floods etc.

5. Some Problems in Facing Climate Change in Manipur

A. Population Growth: The population of Manipur according to the 2011 census was only 28.56 lakhs. It cannot be said to be alarming on face value in comparison with other states if one does not account its commonly habitable valley area minus 90% of the hilly areas. Population density of the state is 128 per sq. km as per 2011 census. The growth rate of population of Manipur in the years 2001-2011 was only 24.5 as against 30.02% during 1991-2001.The percentage of urban population in Manipur is 29.21%. About 42.54% (provisional census-2011) of the total urban population of the state is found settled in the two Imphal city districts. Population growth poses a big problem for a small state like Manipur where even land for residential or agricultural purposes even are hardly available in the valley districts especially Imphal districts and because of which man has to encroach upon forest land, natural landscape, lakes etc. causing an adverse impact on the climatic conditions, environment and ecosystem of Manipur. Increase in population increases sewage and wastage beyond the carrying capacity of nature to do away with it.

B. Urbanisation: Once there were widespread vegetation, extensive landscape, village forests and lakes all around. Imphal is the only class 1 city in Manipur. Though Manipur is a hilly state as more than 90% of the total land area belongs to the hilly areas, however, the state is not declared as a hilly state, may be due to constitutional provisions and political concerns. It causes congestion in the valley areas as only certain communities are permitted to settle in the hilly areas.

Unplanned development of Imphal city has led to growth of haphazard and clustered settlement. Residential areas, industrial areas, offices complexes are not properly/separately located as required. Public transport system passing through the narrow lanes, the market places and densely populated areas are prone to accidents and loss of life. As a result of population explosion, a large number of citizens remain deprived of the basic amenities such as housing stock, public transport system, water supply, solid waste disposal, provisions of sanitation and sewerage system. Valley areas are not spacious enough to provide proper industrial locations away from the city areas as per the rules and regulations of modern town planning.

C. Drying Up/Elevation of Lakes: In Manipuri, PAT means LAKE though it does not connote its actual area or size. Manipur had many inundated areas taking shape as natural pats or lakes, may be because of bad drainage systems. In order to meet the growing demand of land for urbanization and offices for development activities, the lake sites had been filled and village forests areas being devastated. There had been a number of lakes in this city district. Mention may be made of the Lamphelpat which was once a large fresh water lake and where, at present, there are all the important offices, hospitals, colleges, schools as required to make the headquarter city of not only of Imphal West district but of the entire state. Takyelpat, Akampat, Porompat, Khonghampat and Sangaipat had also been elevated and are used as office complexes and as educational centers.

D. Deforestation/Forest Degradation: A forest is a carbon sink that will help in reduction of carbon dioxide used by the plants in the process of photosynthesis and thus help reduction of GHGs and prevent Climate Change. Secondly, it exhales oxygen, the life giving breath of animals. Felling of trees of high economic value for fuel is a great loss to the forest. Burning of bamboo forest and trees simply for shifting cultivation is a double loss as the expected/would be product would be worth the economic value of the bamboos or trees cut or burnt down.

The forest Department has the right to manage only the reserved forest of 1,467 Km sq (8.42% of the total forest area) (State Of Forest Report, 2009) [17] directly and to take care of the protected forest. There has been a major portion of the unclassified forest area of 11,780 km sq. (67.63%) (State Of Forest Report, 2009) [17] not controlled by the department and where traditional jhum cultivation is widespread and where excessive exploitation of forest is done. "It is estimated that about 70,000 families are traditional Jhumias constituting about 80% of the total tribal population who earns their livelihood by practicing jhuming. Forest cover affected due to shifting cultivation is about 855 sq.km or 85,500 ha. The extent of area affected by forest fire is estimated to be about 2000 sq.km annually (Annual Administrative Report, 2010-11). Forest degradation/deforestation is one of the main causes of climate change. About 60% of the carbon dioxide could be exploited by the forests.

E. Emissions of Fossil Fuels: Manipur has the least number of industries though it has unexplored mineral wealth. Cottage industries are dominant in industrial sector. So the major source of emission of fossil fuels is automobile exhaust.

As per record collected from the Directorate of Transport, Government of Manipur, the record on vehicular population up till 2013 in Manipur are as follows:

Table: Vehicular population at Districts of Manipur (as on 31.03.2013)

Categories of vehicles	Imphal West	Imphal East	Thoubal	Bishnupur	Chandel	Senapati	Ukhrul	Churachandpur	Total
Truck	7866	677	849	1138	578	367	164	891	12530
Bus	1646	194	179	198	174	114	-	172	2677
M/Bus	542	1	147	160	115	1	-	138	1104
Jeep	10223	660	1170	281	369	234	219	287	13443
Car	18375	2115	334	380	252	407	247	852	22962
Taxi	1975	323	9	49		18	15	88	2477
Tractor	962	587	594	18		8	2	127	2298
Auto Rickshaw	7754	1831	956	402	274	425	45	928	12615
2wheelers	114977	12791	12801	1461	175	905	353	7391	150854
Trailers	395	2	66	-	-	-	-	56	519
Others	405	24	251	-	-	-	2	73	755
Total	165120	19205	17356	4087	1937	2478	1048	11003	222234

Source: Envis Centre Manipur

Manipur has no big industries. However, a number of small scale industries are flourishing. There are dye houses, bakeries and other small scale industries using petrol/diesel run generators/engines. No strict rule is applied to compel the use of CNG, nor any other cleaner gas, nor application of any harsher punishment on the use of age old vehicles or machines.

7. Measures to control climate change

Use of fossil fuel run vehicles and machines can be replaced by using clean fuels such as CNG or solar energy vehicles or battery run vehicles. Electric vehicle is also another alternative. It will reduce CO_2 level to a great extent. Solar energy can be used for domestic purposes mainly in equatorial and tropical regions where sunshine is received regularly. Use of biogas energy from cow dung or human

excreta or degenerated vegetation is an alternative. Bio-fuels such as ethanol and biodiesel are prospective options for India. The importance of the uses of biogas energy is many fold. Firstly, it will reduce CO_2 level. Secondly, it will reduce family expenses and is thereby economically more beneficial. Thirdly, the remains after extracting the biogas are a good natural fertilizer.

Forestation is another measure to control the greenhouse effect. Carbon dioxide is used by the plant in the process of photosynthesis. It will effectively reduce 60% of the CO_2 level, one of the major factors of climate change. Deforestation should be checked with a strong hand with harsher legal provision. Shifting cultivation should be practically banned, not in the pages of legal books. There should be control of the state government practically, over the entire forest land. Greenery or re-forestation should be taken up in large landscape, wastelands and deforestation areas under government initiatives with enthusiastic public participation. Encroachers in forest should be deported. By doing so, it will help in the reduction of CO_2 level.

There should be restrictions on the emission of CO_2 and CFCs from the factories and automobiles. Old petrol/diesel run machines/engines should be regularly checked and a particular limit of emission should be fixed to allow them to continue its working. Set conditions in giving license, application of strict provisions as regards emission level of harmful gas and regular checking/renewal of license should be done on the basis of efficiency of the petrol/diesel run machines or engines, not on the table but in practical fields.

8. Role of Media in Creating Awareness:

Media is generally regarded as the fourth pillar of democracy due to its social responsibilities. In Manipur, there are all types of media available right from print media, local and national, in all medium, English or Hindi or Manipuri or tribal dialects as well as electronic media such as radio, television, films and the internet based new media. The media is catering enough information about climate change in the local as well as the national media. The literacy rate of Manipur is 76.94 percent as per 2011 population census which is very high. The forest coverage is 78.01% of the total geographical area which is much more than the national target of 33%.

However, climate change is a global issue that requires global efforts. Each country/state represents a unit of a common platform to fight against the climate change So, there is no limit in our efforts to reduce the effect of climate change as there are many countries which are not contributing their share of efforts to reduce the effect of climate change. The efforts to reduce the effect of climate change may be local but the effect/impact will be universal such as the sunlight, the air and the rain knows no boundary.

Having awareness of anything is taking cognizance of its presence. Thus, we are aware when we take cognizance of the importance of anything, have interest in it and urge to understand it. The understanding can be imparted through various media such as radio, television, films, drama, newspapers, magazines, advertisements etc. Focus on one issue from various angles will increase the urge to understand and strengthen the awareness. So, it is the role of media to highlight the causes, impacts and necessary steps/measures to keep aware of climate change. However, it requires a qualified reporter who possesses the scientific knowledge of climate change/environment.

As far as the environmental issues are concerned, media either as a risk communicator, or as a promoter of data, information and good practices of any kind, should smooth the progress of people to become more environmentally responsible and cultivate an environmental awareness (Sharma, 2012; Arlt *et al*, 2011) [13, 10]. Additionally, media (electronic or print) could help people associate reasons and effects, thus to get informed and to reflect upon the given information, in order to understand the origins and the causes of the major environmental problems (Arlt *et al*, 2011; Forno 1999; Hansen, 2011) [10, 11, 12].

It should be made mandatory that every media house has a qualified/well trained reporter on environmental news to carry environmental news at regular intervals as fixed by the government. The govt. should take serious note on climate change and should make the public aware of it through advertisement, art, dramas, film, print media and electronic media at the cost to be borne by the government. Mass sensitization programmes, seminars, and conferences should be held regularly by the govt. as well as NGOs. Research works on environment/climate change should be encouraged.

The impact of climate change is not just immediate. It takes years of experiences or scientific records to bring it to our notice. So, general public who have no knowledge about the climate change, its causes and impacts, are not aware of its consequences. Moreover, the general public are so much engaged in their day to-day activities that they are sometimes unable to think of even tomorrow. In the case of some others, it is out of ignorance and lack of awareness of the resultant hazards that he does not take care about the climate change. It is the role of media to establish the close connection of human life with the environment and convince him about the threat on his survival and his future generations on earth if the present trend of climate change/environment degradation continues unchecked and that there is still his share of contribution to save it.

The role of media in shaping public understanding of environmental issues has been well documented in recent years (Burgess. 1990) [7]. The media are instrumental in shaping public understanding of environmental issues in India (Chapman *et al*, 1997) [8]. Environmental issues such as climate change, pollution and soil degradation are often covered in the media. It is the media that decides what is good for the public and prioritize the issues that are to be addressed. For the news selection authors use specific criteria such as human interest, general importance, conflict, temporality and geographical or cultural proximity (Shoemaker & Reese, 1996) [9].

Media plays a vital role in educating and enlightening the people and the governments to protect and preserve natural resources in the interests of future generations and the climatic chaos. Sustainable Development is attained by protecting the environment in a judicious use of natural resources. Countries both the rich and the poor have an equal stake in this stewardship of the earth. The very survival of our planet depends upon it. In this regard media plays a pivotal role in creating awareness and bringing the positive behavioral change among people in mitigating the anthropogenic climate change. Hence, the role of communication and mass media is immense in climate change and sustainable development. (Yadav, Rani, 2011, p.16) [15].

The media plays very important in educating the people about climate change. It can inform vulnerable impacts and how they can adopt them, and reduce the amount of earth warming. High-quality media coverage of climate change can give better informed publics, policymakers and more effective policy making. Better media coverage of climate issue can raise the alarm of environmental issues like global warming, acids rain. Across the world media can create the awareness of the challenges that developing nations face, and promote a sustainable outcome to the intergovernmental climate change negotiations. (Shanahan, 2011) [14].

Conclusion

A simple knowledge about climate change without action with a proper planning to secure our future will not help saving our only living planet i.e. the earth. A new institutional arrangement is urgently called for implementation on the basis of practical knowledge gained from new experiences and experiments all over the world as it requires a co-operative or organized effort to achieve its goal. An independent monitoring and evaluation framework is required for effective implementation for each nation. Environment education in every school and awareness campaign through every media at regular intervals with well qualified and experienced reporters should be made compulsory and licensing conditions under a direction by the government. A big budget/ financial assistance will be required for its implementation and funding to the poor/underdeveloped countries, not only it requires sharing of knowledge with them. It is a global problem that requires global effort before it is too late. Projected time for adverse consequences i.e. 2035-2040 is very near.

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