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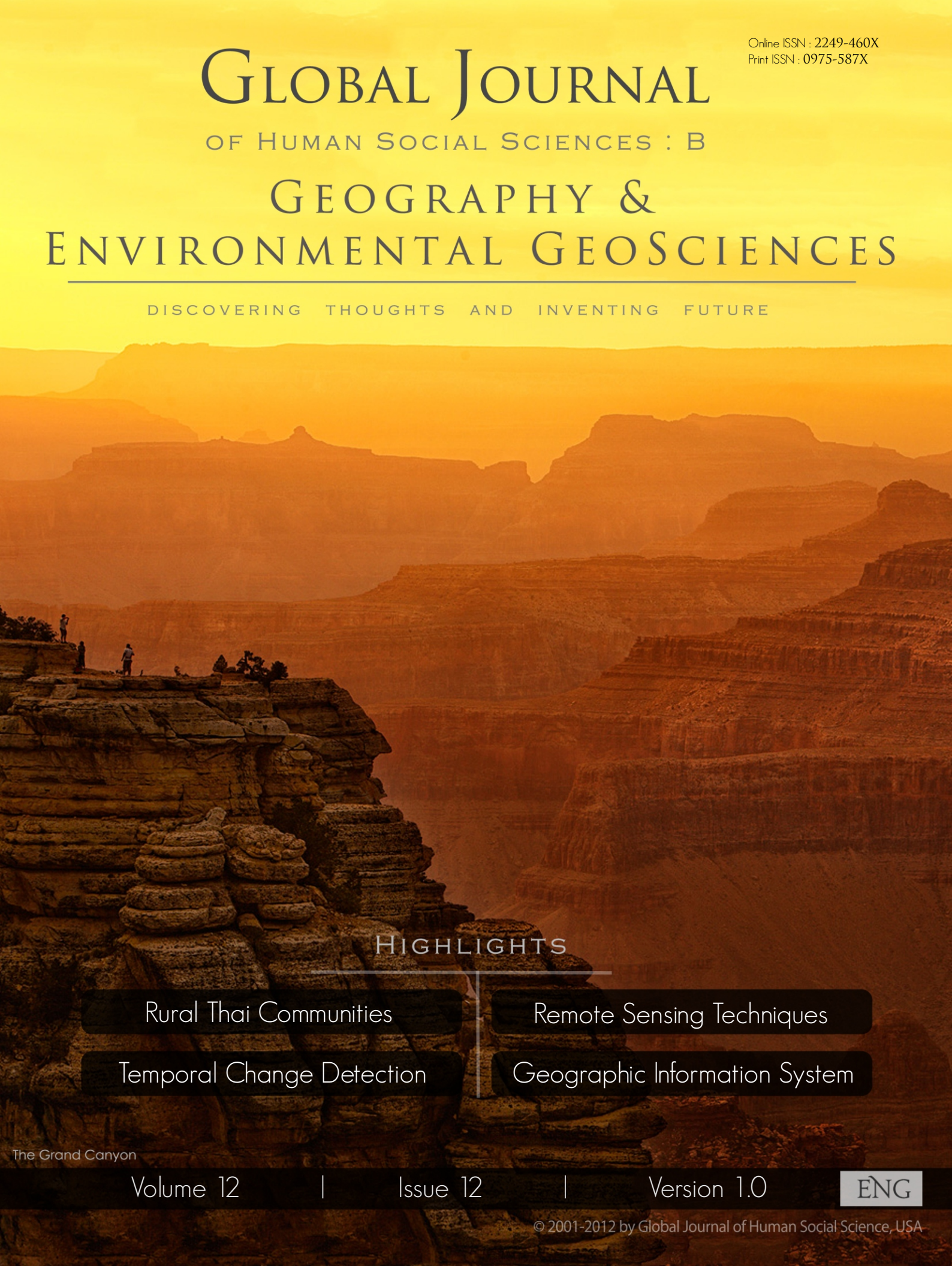

Highlights

- Rural Thai Communities
- Remote Sensing Techniques
- Temporal Change Detection
- Geographic Information System

The Grand Canyon

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Development of Risk Assurance Criteria to the Utilization of Natural Resources and Environment for Sustainable Development of Life Quality, Economy and Society in Rural Thai Communities

By Dr. Vinai Veeravatnanond , Dr. Som. Nasaarn , Dr. Wannapa Nithimongkonchai , Dr. Bunlert Wongpho & Mr. Kotcharat Phookung

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Abstract - The research aimed at developing model of the risk assurance indicators to the utilization of natural resources and environment for sustainable development of Thai communities and evaluation of risks indicators on natural recourses and environment for sustainability of life quality, economy, and society. Mixed research methodology–both quantitative and qualitative- was employed to collect data from the various sources, related documents experts, and indigenous group from three villages- namely, upper north (Nan), central north (Uttaradit), and lower north (Pijit) with 10 villages of each to construct and validate the hypothetical indicators. A multi-stage sample size was included 80 community experts, 140 general experts, 350 community leaders, and 407 family delegates in Northern Thailand to evaluate the practicality and appropriateness of the constructed risk assurance indicators. The data were collected by group discussion, deep interview, and questionnaires.

Keywords : *Sustainable Development, Risk Assurance Indicators, Natural Resources and the Environment.*

GJHSS-B Classification : *FOR Code : 160507 , 160802*

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Development of Risk Assurance Criteria to the Utilization of Natural Resources and Environment for Sustainable Development of Life Quality, Economy and Society in Rural Thai Communities

Dr. Vinai Veeravatnanond [α], Dr. Som. Nasaarn [σ], Dr. Wannapa Nithimongkonchai [ρ], Dr. Bunlert Wongpho [ω] & Mr. Kotcharat Phookung [¥]

Abstract - The research aimed at developing model of the risk assurance indicators to the utilization of natural resources and environment for sustainable development of Thai communities and evaluation of risks indicators on natural recourses and environment for sustainability of life quality, economy, and society. Mixed research methodology–both quantitative and qualitative-was employed to collect data from the various sources, related documents experts, and indigenous group from three villages- namely, upper north (Nan), central north (Uttaradit), and lower north (Pijit) with 10 villages of each to construct and validate the hypothetical indicators. A multi-stage sample size was included 80 community experts, 140 general experts, 350 community leaders, and 407 family delegates in Northern Thailand to evaluate the practicality and appropriateness of the constructed risk assurance indicators. The data were collected by group discussion, deep interview, and questionnaires. The data were analyzed by using mean, percentage, median. LISREL Program version 8.30 was applied, to evaluate the practicality and appropriateness of the constructed risk assurance indicators.

The research yielded 3 main factors with associated risk indicators to the utilization of natural resources and the environment : first, natural resources and environmental revitalization with 4 sub-factors, namely, variety of plants, wildlife, forests, soil, and water; second, hazardous waste substance prevention with 4 sub-factors , namely, hazardous waste, rubbish, smoke and dust, and natural disasters; third, resource management in community, with 5 sub-factors, namely, forest, wildlife, and water animals, soil, water and energy, total 13 sub-factors 57 associated indicators in all. Also, 3 main factors with associated indicators to sustainable development are found : first, life quality with 6 sub-factors, namely, food, clothes, household equipments, health cares, housing, environment management; second, economy with 4 sub-factors, namely, raw material for productivity, distribution and transportation; third, society with 4 sub-factors, namely, cooperation, cares, safety, peace, luxury mitigation, moral ethical values, total 14 sub-factors 66 associated indicators in all.

The models of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality were fitted the empirical data with $\chi^2 = 62.04$, $p = 0.06$, GFI = 0.98, AGFI = 0.94, RMSEA = 0.03, CN = 401.96, to the utilization of natural resources and environment.

In evaluation of the risk assurance indicators, the data confirmed their practicality at a high level, the means were different of different part with statistical significance at the level of.05, the relation of risk assurance indicators to the utilization of natural resources and environment for sustainable development were significance. For the appropriate model and guidelines for developing there were 8 major activities, In conclusion, the developing model were appropriate.

Keywords : Sustainable Development, Risk Assurance Indicators, Natural Resources and the Environment.

I. Introduction

The development of our nation from the past have always been placing more emphasis on economic growth rather than the happiness of man in society. Thus, it is the development that lack equilibrium. And it is evident that the environment and natural resources are being depleted with exerting a huge impact on life quality of Thai people. The Thai people are facing a number of diseases, the worst of which is cancer. As to economy, farmers are getting poorer, running into debts in social life and culture, and crimes are becoming threatening problem of Thai society.

Such impact indicates unsustainable development, the fact that economic growth is beyond the carrying capacity of our existing natural resources is confirmed. Through lack of evaluation criteria as to what indicators to use and how to use so as to assure the risk against damaging impact on life quality, economy, and society in the future-especially the utilization of natural resources in rural communities. The researcher is interested in developing the measuring criteria for use in policy-making at national and local level of administration.

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II. Objectives of the Research

a) *To construct and develop sets of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.*
b) *To Confirm Factors Analysis Model of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society.*
c) *To evaluate the constructed risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.*
d) *To search for guidelines for developing community learning process leading to action planning for utilization of natural resources and the environment of community for sustainable development of life quality, economy and society.*

III. Research Methodology

Mixed research methodology – both quantitative and qualitative, was employed to collect data, to address the objectives through Participatory Learning Appraisal: PLA and Participatory Action Research: PAR

a) Population and Samples

i. *The population was determined, consisting of earned men of the community experts, local organization leaders, family leaders in rural communities of the north.*
ii. *Multi-Stage Random Sampling was employed to draw a sample of 4 groups of informants: group 1, 80 community experts, group 2, 140 general experts; group 3, 350 community leaders, and group 4, 407 family delegates in the 3 villages in the north of Thailand, as well.*

b) Research Instruments

i. *Two sets of questionnaires were constructed*

Set 1. Intended for the experts and learned men of the villages to validate the factors with associated indicators tentatively constructed.

Set 2. Intended to evaluate the level of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.

ii. *Focus Group Structured Interviews*

A set of questions as guidelines for dialogues with the experts and learned men of the villages intended for definitions of factors and associated indicators.

iii. *Recording forms to record the data for further analysis to formulate a model.*

iv. *Video camera and sound recorders for group discussion recordings.*

c) Research Procedures and Data Collection

Four phases of research were conducted as follows:

Phase 1: Constructing tentative factors with associated indicators, which consist of two steps.

Step 1. Determine a set of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities through research and document analysis

Step 2. Determine the definitions and factors with the association indicators, using Qualitative Analysis--Participatory Learning Appraisal: PLA of the participants from academic institutions, government, local organization leaders and community leaders through focus group discussion, intended for the factors and indicators based on authentic conditions of 3 geographical areas in the north, classified by ecological features. The sample consists of 80 community experts

Step 3. Validate the indicators through group discussion by the determined sample of 140 general experts

Phase 2 : a confirmatory analysis was conducted in order to check the model with the empirical data collected by interviews with 350 community leaders from 30 communities of 3 provinces in the north. For this particular analysis LISREL Program Version 8.30 was used

Phase 3 : Evaluate the risk assurance indicators, the data confirmed their practicality at a high level, as well as sustainable development for life quality, economy and society, using the constructed and validated indicators. Data were collected from 407 participants from 30 communities as evaluators, and the results were recorded and stored as database of communities.

Phase 4 : Proposed Guidelines for Practices in developing participatory learning process, leading to action planning of the utilization of natural resources and the environment have been developed. This was done in a brain storming session of 30 community leaders chosen from the three communities with the highest mean scores from the evaluation in stage 3.

d) Statistics for Data Analysis

i. *Descriptive statistics–frequency, percentage, median, mean and standard deviation*
ii. *Inferential statistics*

1. Analysis of Pearson Product Moment correlation coefficient between Risk Assurance Criteria to the Utilization of Natural Resources and Environment and Sustainable Development of Life Quality, Economy and Society in Rural Thai Communities.
2. Confirmatory factor analysis was used for the scrutiny of the model by LISREL Program.

3. F-test, using MANOVA technique to compare the differences between means of each factor on the basis of independent variables--3 geographical areas.

IV. Research Results

a) Construction and development of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.

i. *Research yielded 3 main factors with associated risk indicators to the utilization of natural resources and the environment : first, natural resources and environmental revitalization with 4 sub-factors, namely, variety of plants, wildlife, forests, soil, and water, with 23 associated indicators in all; second, hazardous waste substance prevention with 4 sub-factors, namely, hazardous waste, rubbish, smoke and dust, and natural disasters, with 17 associated indicators in all; third, resource management in community, with 5 sub-factors, namely, forest, wildlife, and water animals, soil, water and energy, with 17 associated indicators in all.*

ii. *Research yielded 3 main factors with associated indicators to sustainable development are found: first, life quality with 6 sub-factors, namely, food, clothes, household equipments, health cares, housing, environment management with 29 indicators, second, economy with 4 sub-factors, namely, raw material for productivity, distribution and transportation, capital, with 18 associated indicators in all; third, society with 4 sub-factors, namely, cooperation, cares, safety, peace, luxury mitigation, moral ethical values, with 19 indicators in all.*

b) In the confirmatory factor analysis of the models of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality were fitted the empirical data with $\chi 2 = 62.04$, $p = 0.06$, GFI = 0.98, AGFI = 0.94, RMSEA = 0.03, CN = 401.96, The other indexes were all in accord with the set standards.

c) Analysis of evaluation of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.

i. *Risk assurance indicators to the utilization of natural resources and the environment were evaluated as a whole at a high level with $\overline{X}$ =2.40, S.D.= .46. When taking each dimension into account, the researcher found that natural resources and environmental revitalization were rated at a high level with $\overline{X}$ =2.33, S.D.= .41; hazardous waste substance prevention, at a high level with $\overline{X}$ =2.42, S.D.=.65; resource management in community at a high level with $\overline{X}$ =2.56, S.D.= .42. The high level indicators numbered 34, accounting for 59.64 %; the moderate level indicators, 23, accounting for 40.36 % of the variation in all, respectively.*

ii. *Analysis of evaluation of sustainable development for life quality, economy and society ,using the constructed and validated indicators yielded the overall picture at a high level with $\overline{X}$ =2.52, S.D.=.28 When taking each dimension into account, the researcher found that life quality was at a high level with $\overline{X}$ = 2.48, S.D. =.41; economy, at a high level with $\overline{X}$ = 2.42, S.D.=.36 ,; society, at a high level with $\overline{X}$ =2.48, S.D.=.41. The high level indicators numbered 60, accounting for 90.91 %; the moderate level indicators, 23, accounting for 9.09 % of the variation in all, respectively.*

iii. *Results of the comparison of the level of risk assurance indicators to the utilization of natural resources and environment on the basis of geographical areas: the upper north, the central north and the lower north. Analysis of the comparison results yielded a significant difference between means at the .05 level. whereby the levels of risk assurance were placed at a descending ranks: the central north, at the high level with $\overline{X}$ =2.51, S.D.= .48; the lower north at a high level with $\overline{X}$ =2.40, S.D.= .51 and the upper north at a moderate level with $\overline{X}$ =2.30, S.D.= .33.*

iv. *Results of the comparison of the level of sustainable development of life quality, economy and society in rural Thai communities on the basis of geographical areas: the upper north, the central north and the lower north. Analysis of the comparison results yielded a significant difference between means at the .05 level whereby sustainable development for life quality, economy and society were placed at descending ranks: the central north, the most developed at the high level with $\overline{X}$ = 2.60, S.D.= .02; the lower north at a high level with $\overline{X}$ =2.43, S.D.= .02 and the upper north at a high level with $\overline{X}$ = 2.43, S.D.= .02*

v. *In an analysis of correlation between all factors dimensions of risk assurance of the utilization of natural resources and environment and*

sustainable development of life quality, economy and society, a high relationship was found with correlation coefficient r = .80, which was significant at the .05 level.

vi. *In comparison between means of all factors dimensions of risk assurance of the utilization of natural resources and environment and sustainable development of life quality, economy and society, it was found the former exerts a great impact on the latter at the .05 level of significance.*

d) *Proposed Guidelines for Practices in developing participatory learning process, leading to action planning of the utilization of natural resources and the environment have been developed. An 8-activity supplementary model is developed, which includes:*

i. *Studying and diagnosing of community problems.*
ii. *Action planning based on the problems and needs of each community.*
iii. *Seeking for alliances and supports for those involved to participate.*
iv. *Facilitating community learning process.*
v. *Cultivating public awareness of natural resources and the environment.*
vi. *Designing and enforcing measures and regulations of community.*
vii. *Disseminating through networking and building agricultural learning centre for sufficiency economy or the neo-theory, to tighten food security and food safety for community.*
viii. *Asking for supports from local organizations and external agencies.*

e) *Example of Development Indicators*

Table 1 :

Natural Resources and Environment	Utilization of Natural Resources
1. Conservation a local plant.	1. Food preparation for family member.
2. Utilization of a local plant.	2. Food for health.
3. Studies of endanger species.	3. Use of local vegetable and meat.
4. Reforest on a public land.	4. A safety house.
5. Reserve of green area.	5. Reuse/Recycle home material.
6. Protection of forest burning.	6. Home physical management.
7. Bio farm.	7. Reduce cost of traditional cultures.
8. Reduce use of chemical fertilizer.	8. Family saving plan.
9. Toxic prevention.	9. Buy a local product.

V. Discussions

a) *Development of risk assurance indicators to the utilization of natural resources and environment and sustainable development of life quality, economy and society in rural Thai communities.*

Through a participatory process of the stakeholders in community, a number of the indicators are determined and validated. These indicators are diverse covering various dimensions of natural resources and the environment because the definitions are made carefully and based on ecological conditions of each community as perceived by the residents. (Vanee Gamgate. 2545). In every phase of research procedure, the experts, academics, development practitioners and learned men of villages get involved. This is a theory of participation, which is relevant to social development, especially in developing the indicators to development, community residents should play important roles because they are the actors who determine development process and benefit the outcome. (Havanond Napaporn. 2005).

In sum, 3 main factors with associated sub-factors as risk indicators to the utilization of natural resources and the environment emerges: first, natural resources and environmental revitalization with 4 sub-factors, namely, variety of plants, wildlife, forests, soil, and water; second, hazardous waste substance prevention with 4 sub-factors, namely, hazardous waste, rubbish, smoke and dust, and natural disasters, third, resource management in community, with 5 sub-factors, namely, forest, wildlife, and water animals, soil, water and energy.

All these factors are main resources, extremely important to human living. If over consumed beyond the carrying capacity of the natural resources, they are bound to exert a high impact on man as evident in natural and social phenomena that humans are experiencing today such as global warming, diseases and health problem, social problem and economic crisis.

As for the sustainable development of life quality, economy and society in rural Thai communities, 3 main factors with associated sub factors indicators to sustainable development emerged: first, life quality with 6 sub-factors, namely, food, clothes, household equipments, health cares, housing, environment management, all of which are basic necessities for life quality of humans, which is the economic system of community connected with economic productions from origins of waterways, mid stream, and the outlets; second, economy with 4 sub-factors, namely, raw material for productivity, distribution and transportation, and capital; third,

society with 4 sub-factors, namely, cooperation, cares, safety, peace, luxury mitigation, moral ethical values, all of which are indicators to rural society based upon sufficiency economy and sustainable development. Development must be carried on and aiming at the equilibrium in life quality of man and the environment, economy, and society. (Pradhampidok, 2003).

b) *In the confirmatory factor analysis of of the models of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality by using LISREL Program it was found that all Model were fitted the empirical data, it was found that on the whole the factors and the indicators jived with the empirical data, proving the appropriateness of the model. (Somkid, 2004; Wannee, 2002) As for the order of importance based on the weight of the factors, it was found that resource management in community factor ranked the highest followed respectively by hazardous waste substance prevention and natural resources and environmental revitalization*

c) *Evaluation results of risk assurance indicators to the utilization of natural resources and environment and sustainable development of life quality, economy and society in rural Thai communities.It was found that of risk assurance indicators to the utilization of natural resources and environment as a whole are at a high level. Taken into account each dimension of the evaluation, however, factor hazardous waste substance prevention, which may impact on natural resources of community, consists of a number of risk assurance indicators at a high level: appropriate use of plants in community, building community database, household's participation in smoke and dust reduction, planning to monitor smoke and dust, and waste hazard prevention. The research result indicates unsatisfactory management of natural resources and environmental revitalization in community.As for the sustainable development of life quality, economy and society in rural Thai communities, the results of the evaluation came out as a whole at a high level, which concur with the findings by Som Na-saarn. (2551). Na-saarn says that the economy and culture of community in the North East is still stable ; the rural people still conserve their cultural heritage: arts and culture, social values and traditional folkways However, his finding seems to contrast with Hansupo's in which the data show some aspects of social change in the North East. Most people are socially and culturally self-reliant at a low level, accounting for 56 % of the population, which seems to concur with Gamage's in which the evaluation data show self-reliance of families in rural Thailand in such a way that conservation of cultural arts are at a moderate level. In analysis of comparative study of development of life quality, economy and society on the basis of geographical areas, the difference is found significant; this shows the discriminating power of the constructed factors and indicators. (Tabanick and Fidell, 1996) Also, in it is found that a high relationship between all factors dimensions of risk assurance of the utilization of natural resources and environment and sustainable development of life quality, economy and society indicates that a high risk assurance of the natural resource and environment will greatly impact on sustainable development of life quality, economy and society, corresponding to the set hypothesis. The model of all the indicators developed by this research could be applicable.*

d) *Proposed Guidelines for Practices in developing participatory learning process, leading to action planning of the utilization of natural resources and the environment. Out of group discussion came 8-activity guidelines as a supplementary model for developing participatory learning process, leading to action planning of the utilization of natural resources and the environment. The 8 -activity guidelines have been recorded under the heading: research results; they could not be effectively put into practice without participatory learning process. Thus, a supplementary model for developing participatory learning process was further developed, which includes :*

i. *Building a learning process of community leaders through 1) Evaluation feedback in order for them recognize their own state of community 2) Diagnosing community problems to identify weaknesses, strengths, threats, and opportunities, connecting all dimensions of development: the environment, health, learning and culture. 3) Analyzing potential of community, which the development will be able to achieve. 4) Goal setting by the people in community based upon state of the problem and potential 5) determining an appropriate model of practices for sustainable development by translating the vision of community into substantial activities.*

ii. *In the study on risk assurance indicators to the utilization of natural resources and environment and sustainable development of life quality, economy and society, the researcher learns that in determining appropriate guidelines for practices, to substantiate activities are of prime importance. To fulfill this, validation process must include a variety of means. For example, in this study, the researcher employs evaluation techniques with community participation in all phases of the research procedure: operationally defining of the terms such as wellbeing, development, etc. And the most important is*

community leadership development which is to be carried out to achieve this particular purpose, through use of three principles: 1) Empowerment 2) Education and 3) Participation. Empowerment is intended to cultivate leaders' awareness in the importance of development. It is believed that this is one of the most important strategies for social development, leading to success in community development (Rujinak, Uttasit. 2548: 50-68; citing Slocum and others. 1998). Empowerment should be reinforced at both community and personal level, called organization empowerment and psychological empowerment, respectively. Education is intended to render knowledge and information on state and development of community through a variety of means especially self-inquiry in group learning process. Participation is a key word in all phases of research and development, without which development is impossible. Development of Risk Assurance Criteria to the Utilization of Natural Resources and Environment for Sustainable Development of Life Quality, Economy and Society in Rural Thai Communities employs this word through the research and encourages using this word in all types of organization development

VI. Suggestions for Applications

a) *Local governments should use the sets of constructed factors with indicators as a model for further development of the success indicators to sustainable development and criteria to risk assurance management of utilization of natural resources and environment.*
b) *Government agencies in charge of development policy should use the sets of constructed factors with indicators as a model to further develop risk assurance indicators to utilization of natural resources and environment and to evaluate sustainable development of life quality, economy and society for use in such a way consistent with geo-ecology of specific regions.*
c) *The risk assurance indicators to utilization of natural resources and environment and sustainable development should be further developed and modified with measurable criteria, based upon authentic evaluation database in community.*

VII. Suggestions for Further Research

a) *Participatory action research should be continually and repeatedly conducted in community, using the developed indicators; selection of the appropriate indicators are then made and developed into standards for further use in community.*
b) *The model of developing the indicators should be tried out in communities of other regions in order to determine the indicators appropriate for each region.*

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Temporal Change Detection of AL- Hammar Marsh – IRAQ Using Remote Sensing Techniques

By Dr. Salah A. H. Saleh
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Abstract - The Mesopotamian marshlands, the largest wetland in the Middle East and one of the most outstanding in the world have been lost mainly as a result of drainage and damming. The cause of the decline is mainly as a result of damming upstream as well as drainage schemes since the 1970s. The Tigris and the Euphrates are amongst the most intensively dammed rivers in the world. In the past 40 years, the two rivers have been fragmented by the construction of more than 30 large dams, whose storage capacity is several times greater than the volume of both rivers.

The immediate cause of marshland loss, however, has been the massive drainage works implemented in southern Iraq in the early 1990s, following the second Gulf War. Satellite images provide hard evidence that the once extensive marshlands have dried-up and regressed into desert, with vast stretches salt encrusted. Recent satellite imagery shows only limited areas of the marshlands have been reclaimed.

Keywords : *Mesopotamian marshlands, land cover, Landsat images, Digital analysis, Temporal change detection.*

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Temporal Change Detection of AL- Hammar Marsh – IRAQ Using Remote Sensing Techniques

Dr. Salah A. H. Saleh

Abstract - The Mesopotamian marshlands, the largest wetland in the Middle East and one of the most outstanding in the world have been lost mainly as a result of drainage and damming. The cause of the decline is mainly as a result of damming upstream as well as drainage schemes since the 1970s. The Tigris and the Euphrates are amongst the most intensively dammed rivers in the world. In the past 40 years, the two rivers have been fragmented by the construction of more than 30 large dams, whose storage capacity is several times greater than the volume of both rivers.

The immediate cause of marshland loss, however, has been the massive drainage works implemented in southern Iraq in the early 1990s, following the second Gulf War. Satellite images provide hard evidence that the once extensive marshlands have dried-up and regressed into desert, with vast stretches salt encrusted. Recent satellite imagery shows only limited areas of the marshlands have been reclaimed.

The objective of this study was to develop a land cover change detection methodology through digital analysis of satellite data. Two Landsat Images, MSS and TM of AL-Hammar marsh south of Iraq acquired in 1975 and 2002 respectively were selected to demonstrate their usefulness for surface temporal change detection in the Mesopotamian marshlands south of IRAQ.

Keywords : Mesopotamian marshlands, land cover, Landsat images, Digital analysis, Temporal change detection.

I. Introduction

In recent years there has been a significant amount of research put forth in the development of change detection methods using remotely sensed data. Scientists studying global change may find the ability to monitor land-surface changes over time the most important use of satellite image data. The repetitive coverage, consistent data characteristics, and digital format of the image data provided by several satellite systems makes their respective data readily conducive to the production of a digital "change" database in which the spatial and temporal dimensions of land-use and land-cover change can be detected and evaluated.

Current change detection systems use a variety of image processing tools to make changes visible, but typically rely on manual interpretation by expert analysts to delineate the change areas. Most systems look for changes between only two images: one "before" and one "after". Change - detection techniques in common use include: subtracting spectral bands between the images, subtracting a feature space, principal components analysis, and change vector analysis.

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Satellite remote sensing is widely accepted as a technique to study land use and land cover change Dynamics .The use of satellite data for compiling land use change area is becoming substitute for data derived from time consuming satellite images interpretation. Better assessment of land use land cover change using digital analysis of remotely sensed satellite data can help decision maker to develop effective plans for the management of land.

Numbers of researchers have used remotely sensed satellite data for change detection, and a number of approaches and techniques have been developed. Locating and characterizing areas of significant change using remotely sensed data is important for many applications. These include: resource management, urban planning and impacts of human activities on the environment Landsat satellite imagery reveals that in the last 10 years, wetlands that once covered as much as 20,000 square km (7,700 square miles) in parts of Iraq and Iran have been reduced to about 15 percent of their original size. The ecosystem has been damaged and, as a result, a number of plant and animal species face possible extinction. (UNEP, 2004)

Two main approaches to digital change detection have been reported. Both involve multi-temporal images and can be categorized as separate data set or single data set analysis. Separate data set analysis involves classification of each-date imagery separately into land cover classes. The results were subsequently compared. Single data set analysis involves co-registering and re-sampling multi-temporal images into the same dataset and matamatical transformation, mainly image differencing and rationing, is then applied to the raw co-registered images to produce a residual image indicating the relative change in reflectance between the two dates. This technique is gives slightly more accurate result. (See, for example, Nelson, 1982; jenson and toll, 1982: woodwell et al., 1983; Singh, 1986; Quarmby et al., 1987).

II. Digital Change Detection Techniques

Change detection is the process of identifying differences in the state of an object or phenomenon by

observing it at different times. Change detection generally operates by detecting numerical differences in corresponding pixel values between dates. Many digital algorithms have been applied for change detection purposes (Kwarteng and Chavez Jr !998).

The basic reason in using remote sensing data for change detection is that changes in the object of interest will result in changes in radiance values or local texture that are separable from changes caused by other factors, such as differences in atmospheric conditions, illumination and viewing angle, soil moisture etc. It may further be necessary to require that changes of interest be separable from expected or uninteresting events, such as seasonal, weather, tidal or diurnal effects.

Digital change detection techniques may be categorized into two basic approaches: the comparative analysis of independently produced thematic labeling or classifications of imagery from different dates; or simultaneous analysis of multi-temporal data sets. Within these two approaches, there are a number of methods and techniques such as post classification comparison, image rationing and principle components analysis (this list is not exhaustive).

III. Methodology

Landsat Multispectral data provide the longest duration archive of moderately high spatial resolution satellite image data for monitoring the types and rates of land-surface change imposed by human activity. The derivation of change information from Landsat data generally consists of co- registering the data of two or more images of the same area acquired at different time; adjusting the radiometric properties of the data to normalize for varying observation and atmospheric conditions; implementing a change detection method on the combined data sets; and producing an output product that can effectively convey land-surface change on an image or in statistical basis. Although the consistent data characteristics of Landsat data enable ready production of change images, the procedures of change image production can also be implemented on multiple data sets of non-similar data characteristics, allowing combination of Landsat MSS data with data from other sensors, such as Landast Thematic Mapper (TM) and SPOT Satellite.

The study area covers part of Al Hammar Marshes and Shatt Al-Arab. Two Landsat images of different dates, Landsat MSS 1975 in three bands 4,2,1(near IR - 0.8-1.1, red - 0.6-0.7 , green - 0.50 -0.60 micron) with 80 meters resolution and Landsat TM 2002, in three bands 4,3,2 (near IR - 0.76-0.90, red - 0.63-0.69 , green - 0.52-0.60 micron) with 30 meters resolution were used in this work.

Figure (1-a) : False-color composite of Landsat 1975 MSS bands 4,2,1.

Figure (1-b) : False-color composite of Landsat 2002 TM bands 4,3,2.

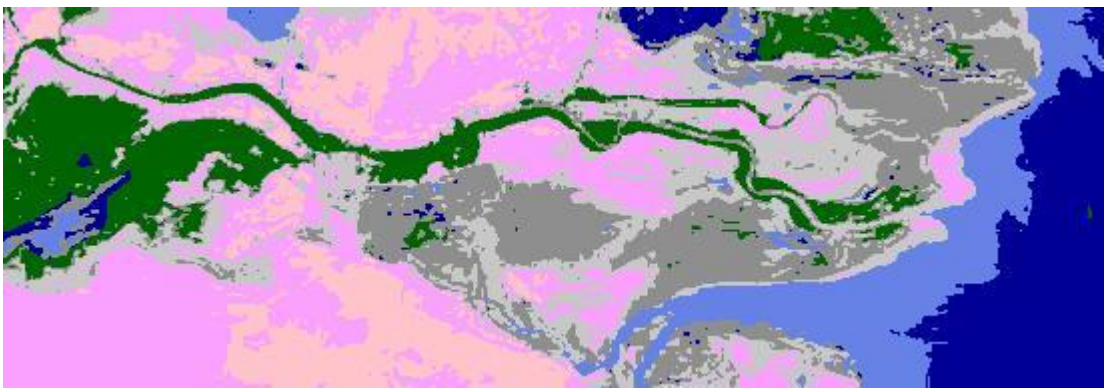
Used images were preliminarily geometrically corrected. Then , image to image registration was done in order to register the 2002 image with image 1975 (master image).Keeping the root mean square error (RMSE) less than 0.5 pixels, an image to image transformation model (third order polynomial) and nearest neighbor resampling was calculated.

Figure 2 : Resample of Landsat 2002 image.

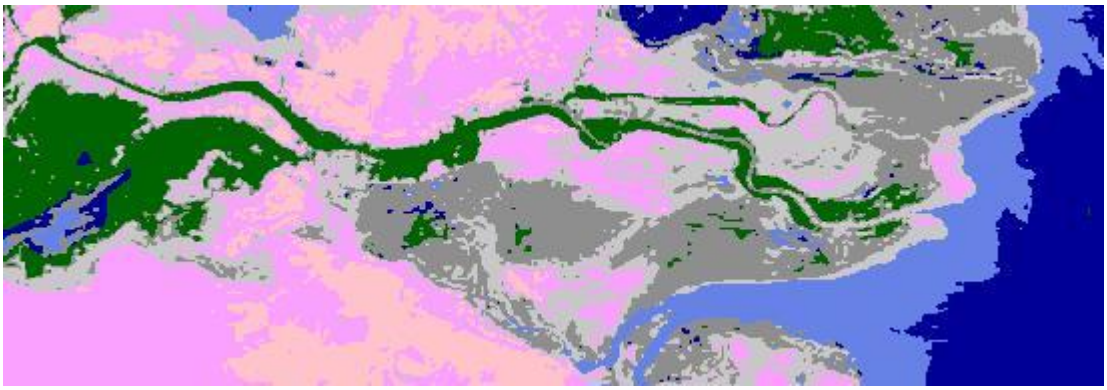
Post-Classification Comparison as change detection technique used in this study to compare temporal land cover/land use change in study area**.** Post classification Involves the classification of each of the images independently, followed by a comparison of the corresponding pixel (thematic) labels to identify areas where change has occurred. There are two general approaches to multispectral classification: supervised classification in which an analyst selects sites of known cover type; and unsupervised (clustering) classification, in which clusters of pixels are generated based on spectral similarities. Both supervised and unsupervised classification requires human expertise to generate the classified imagery. The comparison of separately classified images can be carried out visually, or by computer. Computers are better at quantitative analysis, but humans are able to discern patterns and shape much better, and the effect of mis-registrations may be much reduced. The advantages of post-classification comparison are that it minimizes the search space and the effects of seasonal and atmospheric differences between the scenes. The main problem of this approach is that classification errors, which are usually common, may introduce spurious change detections. Post-classification comparison has been used, e.g., to detect: non-urban to urban or forest to cropland conversion, and changes in general land use, wetlands and forests.

IV. Temporal Comparison Results

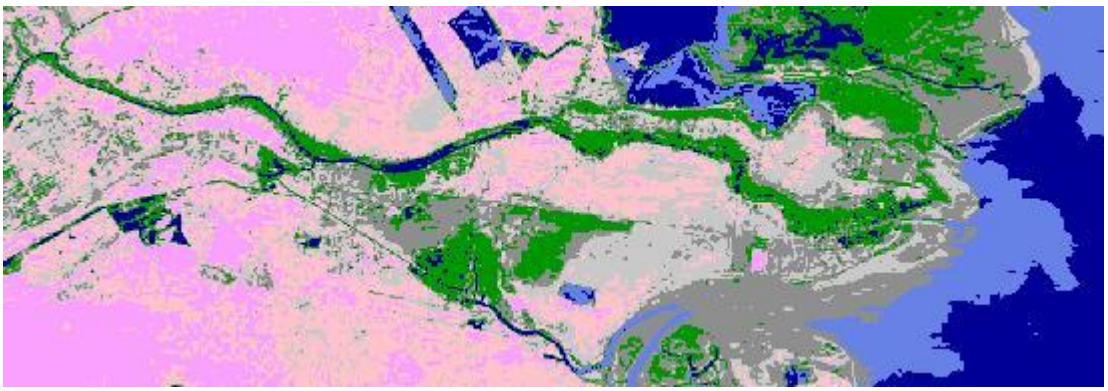
The change detection procedure used has involved a classified images derived for each date. This approach as described above was performed on un-supervised and supervised classifications of Landsat data from 2 dates and subsequently compares the classified images. Hence the output image was greatly dependent upon the accuracy of the classified images. Figures (3-a, b, c, d) and Table (1) summarizes the area occupied (number of pixels) by each class of the images (MSS-1975 and TM -2002) by unsupervised classification methods (K-mean and Iso-data methods).



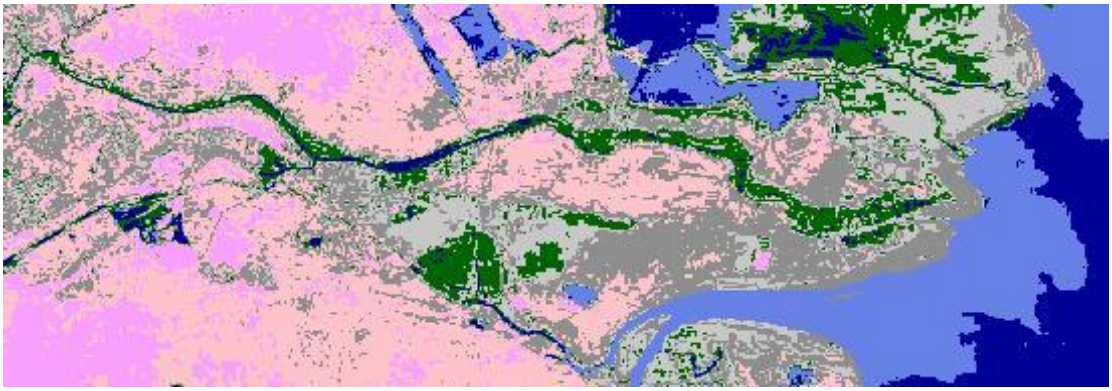
A - Unsupervised classification of 1975 - MSS image by isodata method.



B - Unsupervised classification of 1975-MSS image by k-mean method.



C - Unsupervised classification of 2002-TM image by isodata method.



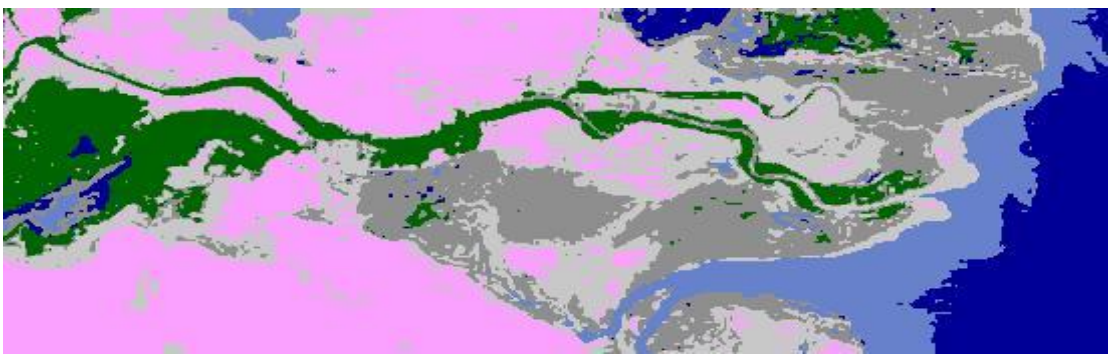
D - Unsupervised classification of 2002-TM image by k-mean method.

Figure 3 : Unsupervised classification by k -mean and isodata methods for 1975 and 2002 images.

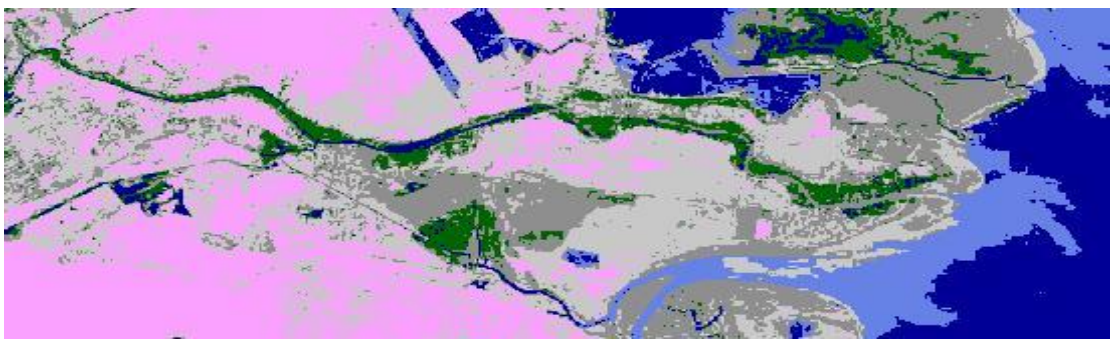
Classes	Class color	Landst MSS 1975		Landsat TM 2002	
		Area(pixel) K-mean	Area(pixel) Iso-data	Area(pixel) k-mean	Area(pixel) Iso-data
Deep water		10628 (10.17 %)	10515 (10.06%)	12586 (12.04%)	12042 (11.52%)
Shallow water		9690 (9.53%)	10015 (9.58%)	10227 (9.49%)	10475 (9.67%)
Palms and Reeds		11893 (11.38 %)	11462 (10.96%)	9186 (8.59%)	8842 (8.40%)
Dry land1		22907 (21.92 %)	23976 (22.94%)	21779 (20.65%)	23422 (22.50%)
Dry land2		10866 (10.39%)	11513 (11.01%)	12984 (12.71%)	15996 (15.31%)
Wet land1		20393 (19.51%)	19193 (18.36%)	19769 (18.51%)	16751 (16.21%)
Wet land2		17853 (17.08%)	17826 (17.05%)	17360 (16.61%)	16963 (16.23%)

Table 1 : Unsupervised classification statistics summary report for MSS-1975 and TM-2002 images.

Supervised Classification for the images of each date was carried out using minim distance method. The training samples selected were based on land cover and terrain. Six different land cover classes were selected including deep water, shallow water, date palms and weeds, wet land1, wet land2, and dry land .Figure (4-a,b) and Table (2) summarizes the area occupied (number of pixels) by each class of the images (MSS-1975 and TM -2002) by supervised classification methods (Minim distance method) .



A - Supervised classification by minim distance method for MSS-1975 image.



B - Supervised classification by minim distance method for TM-2002 image.

Figure 4 : Supervised classification by minim distance method for mss-1975 and TM-2002 image.

Classes	Class color	Landst MSS 1975		Landsat TM 2002	
		Area (pixel)·	Percent (%)	Area (pixel)	Percent (%)
Deep water		10486	10.035	11768	10.173
Shallow water		10065	9.631	8694	8.274
Palms and Reeds		11453	10.959	6336	6.061
Dry land		29498	28.227	34232	32.175
Wet land1		22048	21.098	20782	19.831
Wet land2		20949	20.046	22732	21.537

Table 2 : Supervised classification statistics summary report for MSS-1975 and TM-2002 images.

Table (3) shows the result of qualitative evaluation as well as the rate of land use –land cover changes carried out through the analysis of unsupervised and supervised classification statistics summary reports.

Table 3 : Qualitative evaluation of classification statistics summary report.

classes	k-mean %	Isodata %	Min dist %	Mean %
Deep water	1.87	1.46	0.14	1.16
Shallow water	-0.04	0.09	-1.36	-0.43
Palms and Reeds	-2.79	-2.56	-4.95	-3.43
Dry land	2.32	4.30	3.95	3.52
Wet land	-1.47	-2.53	0.25	-1.26

V. Results and Discussion

By visual interpretation of landast MSS (1975) and TM (2002) false-color composite images, dense marsh vegetation (marsh grass) appears as dark red patches in 1975 image (fig1-a). But in 2002 TM image (Fig 1-b) most of the Marsh lands had dried out. It appear as olive to grayish-brown patches indicating low vegetation cover on moist to dry ground. The very light to grey patches are an area of expose ground with no vegetation, which may be salt flats where before there were lakes.

The elongated red patches along the banks of the Shatt Al-Arab River are Date Palm groves. The date palm belt long Shatt Al-Arab appears as a dark red hue in 1975. Healthy vegetation is characterized by a distinctively strong reflectance in the near infrared represented by red tones in these satellite images. In 2002 image, the intensity of infrared reflectance in the date belt had considerably diminished denoted by red brown indicating stressed and dead vegetation, and the replacement of palms by reeds and desert scrub.

By applying change detection and considering the output figures and tables, we can find there are noticeable changes in land use/ land cover classes' area between 1975 and 2002 images. There are increasing trends to dry land and deep water and decline trends to wet land and shallow water.

Statistical analyses of supervised and unsupervised classification results shows that in 2002 an increasing trend in dry land (3.52%) and deep water (1.16%) and decreasing in wet land (1.26%) and shallow water (0.43%) than 1975. There are decline trends in spatial extent of date palm and marsh vegetation areas (3.43 %) in 2002 than 1975.

These changes caused by IRAQ-IRAN war, and as a result of damming upstream as well as drainage schemes since the 1970s and due to massive drainage works implemented in southern Iraq in the early 1990s, following the second Gulf war.

VI. Conclusion

The obtained results from temporal classification change detection method showed that there are noticeable and clear changes in the land use and land cover in the area for the period 1972-2002. There is no much differences in classification results for supervised and unsupervised techniques.

There are increasing in dry land and deep water areas and decreasing in the wet land and shallow water areas. Also there is decline in spatial extent of date palm and marsh shrubs. These changes caused by IRAQ-IRAN war and as a result of damming upstream as well as drainage schemes since the 1970s.

Change detection has become a useful tool for detecting landcover changes from remotely sensed imagery. It has enabled resource managers to observe changes over large areas and provided long-term monitoring capabilities. Generally we can conclude that digital change detection techniques using temporal remote sensing data are useful to assist human analysts of remote sensing data, and provide detailed information for detecting and assessing land cover and land use dynamics.

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Disposal Sites and Transport Route Selection Using Geographic Information System and Remote Sensing in Abeokuta, Nigeria

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Abstract - Waste management problems result from indiscriminate waste disposal which stems from Inadequate planning and implementation. This fact led to the present study which applied the Techniques of gis and rs to disposal sites and transport route selection in the emerging Megacity of abeokuta. Spatial data such as land-cover types; road and drainage networks of the City were extracted from a geo-referenced high resolution satellite image through on-screen Digitizing using gis softwares such as arcview. The existing disposal sites were geo-located And added as a layer to the map of the city. The land-cover, drainages, and roads were buffered at 30, 160 and 200 meters respectively using preset criteria such as distance of site from a street at 30 m, surface water at 160 m, major roads at 200 m and absence of important economic or Ecological features; to determine candidate sites from the land-cover types. Four legal disposal Sites in saje, olomore, totoro and ita-oshin and patches of illegal disposal sites were identified. Gis analysis gave a total of nine sites out of which only four met the preset criteria. Saje, ita - Oshin, sam-ewang, and ita-ika areas were the most appropriate sites.

Keywords : *Geographic Information System, Remote Sensing, Disposal site, Transport Route.*

GJHSS-B Classification : *FOR Code : 160511, 160401*

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Keywords : Geographic Information System, Remote Sensing, Disposal site, Transport Route.

I. Introduction

The current global trend of waste management problems stems from unsustainable methods of waste disposal, which is ultimately as a result of inadequate planning and implementation. The practice of direct dumping of wastes into water bodies, open, abandoned lands and any other 3 "appealing" sites without proper treatment have led to serious environmental pollution and health-related problems.

Solid Waste according to The United State Environmental Protection Agency (USEPA, 2005) is defined as any garbage, refuse, sludge from a waste water treatment plant, water supply treatment plant or air dried material, including solid, liquid, semi-solid or contained gaseous material resulting from industrial, commercial mining and agricultural operations and from community activities.

Waste management issues should be confronted in a more generalized manner, which means that new strategies need to be designed for considering diverse and variable urban models. This fact demonstrates the necessity of developing integrated, computerized systems for obtaining more generalized, optimal solutions for the management of urban solid waste (Karadimas et al, 2004).

Geographic Information System (GIS) and Remote Sensing are such computerized systems which can be integrated to get optimal solutions for sustainable management and planning of solid waste.

Geographical Information System (GIS) is any system that captures, stores, analyzes, manages, and presents data that are linked to location(s). It allows users to analyze spatial information, edit data, maps, and present the results of any operations (wikipedia, 2011).

Remote sensing is the small or large-scale acquisition of information of an object or phenomenon, by the use of either recording or real-time sensing device(s) that are wireless, or not in physical or intimate contact with the object (such as by way of aircraft, spacecraft, satellite, buoy , or ship) (wikipedia, 2011).

This study emanated from the obvious problems of population and city expansion as a result of rural migration to urban centres; increase in solid waste generation as a consequence of overpopulation; distance of location of disposal sites from residential areas which encourages indiscriminate waste disposal at illegal locations; and insufficient disposal sites leading to a creation of patches of disposal sites all over the places.

The study focused on identifying the present locations of disposal sites and assessing their suitability; determining other locations best suited as disposal sites across the study area; and determining the most appropriate, efficient, and least-cost routes for transporting waste to landfills or recycling centres.

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Characterization of municipal solid wastes (MSW) are impacted by a number of factors, including climate, population, season, income level, social behaviour, the extent of urbanisation, effectiveness of recycling and the presence of industrial activity. Wastes from tropical areas generally contain a relatively high concentration of organic matter (Diaz et al, 2005).

Solid waste generation is a part of every human activity or process stream. Nigeria, having a population of 120 million (Adewumi et al., 2005), generated 0.58kg solid waste per person per day. Several factors influencing solid waste generation in Nigeria and the city of Abeokuta include the following: inadequate technology, facility for separation at source, strength of solid waste management policy and enforcement (Sridhar and Adeoye, 2003). Also are education, income and social status (Abel, 2009).

Disposal of solid waste generated in a community is the ultimate step in a solid waste management system. In the advanced technologies, disposal is preceded by engineering activities such as sorting, volume reduction and / or receding. The open dump method of solid waste disposal is considered as both naïve and dangerous. This is because of the leachate effect (i.e the chemical and biological contaminant in wastes) which could constitute a direct risk to human health (Lasisi, 2007). In some parts of Nigeria, refuse is generally buried, though some heedless burning is sometimes observed (Igoni, et al., 2007).

Diaz et al. (2005) succinctly classified the various types of waste disposal into the following: Uncontrolled open dump; Controlled open dump and Controlled and sanitary landfills. Daneshvar *et al.* (2005) ascertained that GIS is an ultimate method for preliminary site selection as it efficiently stores, retrieves, analyses and displays information according to user-defined specification.

To arrive at the selection criteria for choosing a site for landfill, relevant literature and decision makers' opinion should mostly be sought. Adeofun et al (2006) and Sani et al (2010) gave some specifications which were adapted in this study.

Designing short routes for waste collection is possible within a GIS system. The application of GIS in route planning and designation of collection points in some experiments has shown that GIS is capable and can help improve waste collection in residential neighbourhoods in urban areas.

Secondly, in order to have an efficient solid waste management system, GIS may be adopted because it is capable of handling both spatial and non-spatial data necessary for effective solid waste collection system.

Thirdly, solid waste collection contractors prefer routes which are short and cheap, with high rate of return within a short period. However, traditional methods of handling data are incapable of identifying the least cost routes for solid waste collection.

Fourthly, GIS has been proven to be a tool that provides the alternative method of minimizing operational costs for contractors (Kyessi and Mwakalinga, 2009).

II. Materials and Method

a) *Description of Study Area*

The study was conducted in Abeokuta, Ogun State. Abeokuta is both the capital and administrative headquarters of Ogun State situated in the South-Western part of Nigeria with coordinates between latitude 7° 09′ N and 7° 19′ N and longitude 30 29′ E and 3041′ E (Akanni, 2005).

b) *Data Collection*

A Satellite Image (IKONOS, December 2006) of Abeokuta metropolis was obtained from the GIS unit of Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR), University of Agriculture, Abeokuta (UNAAB).

Land-use / land-cover map, road map, topographic map, drainage map, and other relevant maps were obtained from relevant agencies including the Water, Environmental and Sanitation (WES) department of the Local Governments, Cartography Laboratory at the Department of Water Resources Management and Agrometorology and the GIS Unit of IFSERAR, UNAAB. Global Position System (GPS) device was used to determine the coordinates of existing disposal sites.

c) *Data Analysis*

Five major GIS spatial operations were performed to achieve the set of objectives for this research. These are digitizing, buffering, overlay, query and network analysis (Sani et al, 2010).

III. Results and Discussion

a) *Location of Existing Disposal sites in Abeokuta*

The disposal sites in Abeokuta were located on a map in Figure 1. The legal disposal sites are located at Saje (Old Quarry Site) which happens to be the largest disposal site in Abeokuta; Olomore, Totoro and Ita-Oshin areas while the illegal disposal sites are arbitrarily located at any available space. Some of them as shown in Fig 1 include Lafenwa, Oke-Efon, Ilugun, Ita-Eko, Akinolugbade e.t.c. areas.

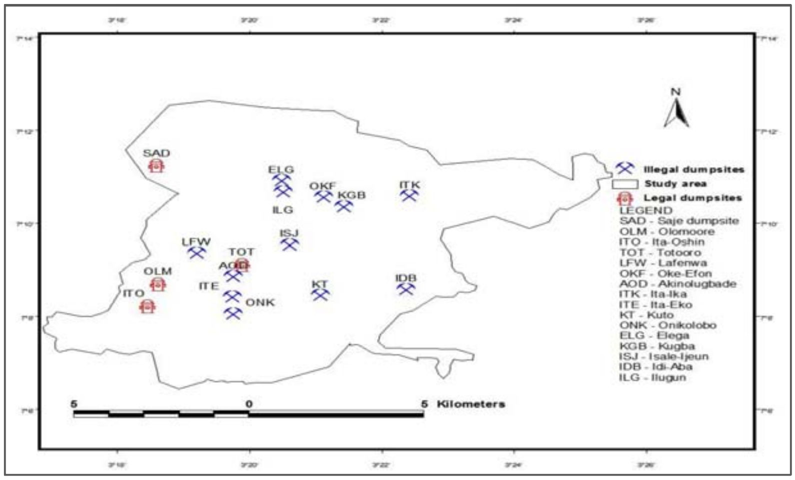

Figure 1: Map of Study Area Showing the Legal and Illegal Disposal sites in Abeokuta.

b) Road and Drainage Networks in Abeokuta

The road and drainage networks in Abeokuta were located on a map in Figures 2 and 3 respectively. The road network consists of the streets, major roads, railway and express road while the drainage network consists of the major river – Ogun River as it cuts across the study area and the surrounding tributaries.

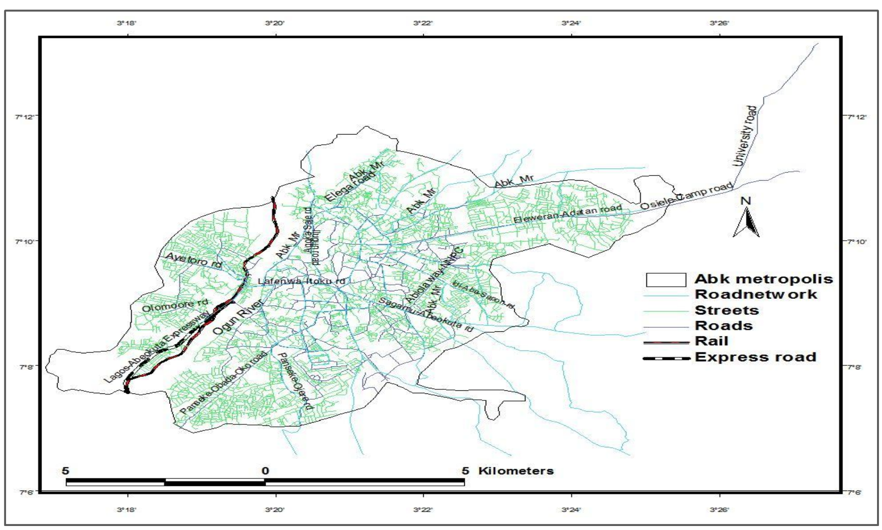

Figure 2: Map of Study Area Showing the Road Networks in Abeokuta.

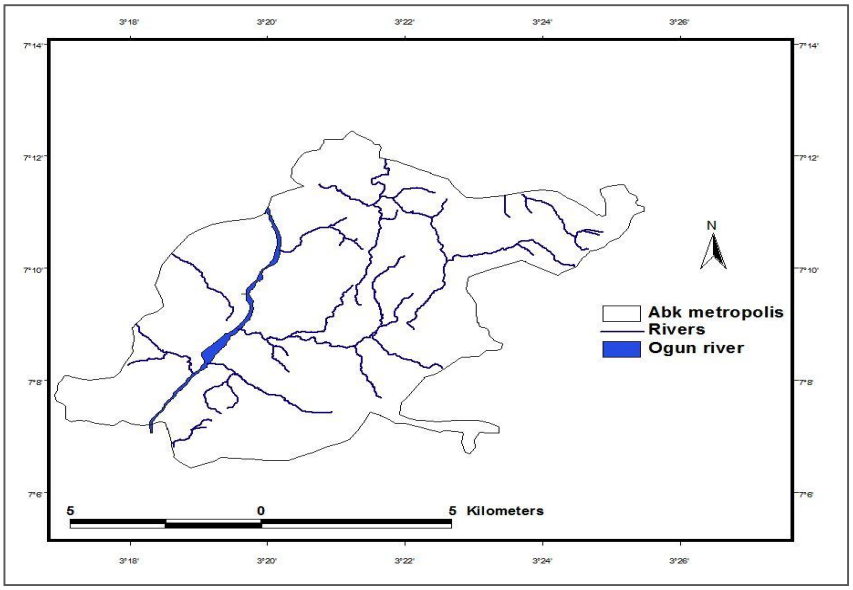

Figure 3 : Map of Study Area Showing the Drainage Networks in Abeokuta.

c) Land-Cover Types in Abeokuta

The land-cover types in the study area are given in Figure 4 below. Land-cover types in Abeokuta include the following: modern and indigenous residential parks layouts; sports centres; water bodies; religious centres;and gardens; commercial centres; barracks and military zones; industrial areas and undeveloped lands among others. Figure.

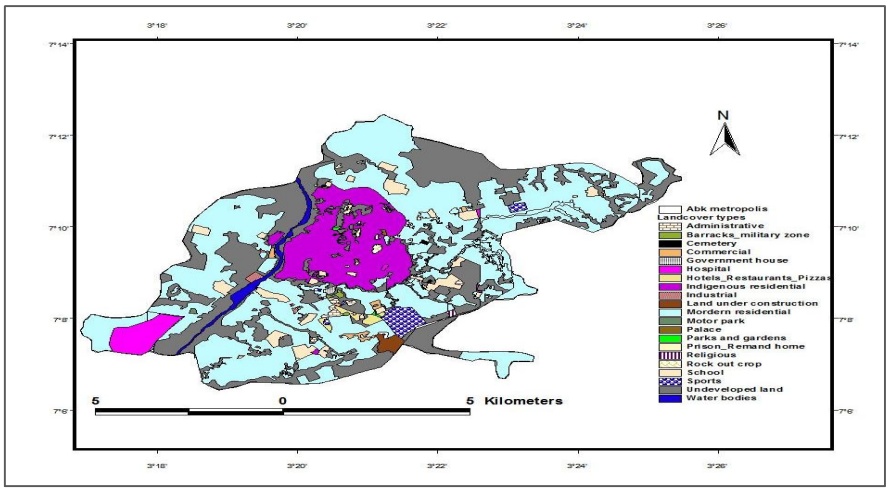

Figure 4 : Map of Study Area Showing the Land-Cover in Abeokuta.

d) Buffering Analysis

In determining the most appropriate locations for siting disposal sites in Abeokuta, a set of buffering analysis were performed on the drainages, land- cover and roads as depicted in Figures 5, 6 and 7 respectively. The distances for creating the buffer zones were adapted from the specifications given by Adeofun et al (2006) and Sani et al (2010). The drainages, land-cover and roads were buffered at 160m, 30m and 200m respectively.

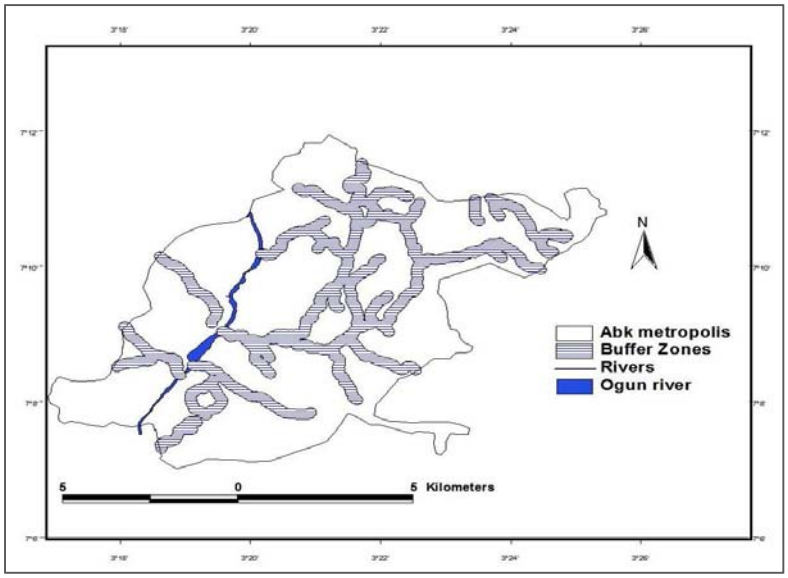

Figure 5 : Map of Study Area Showing the Drainage Buffered at 160m.

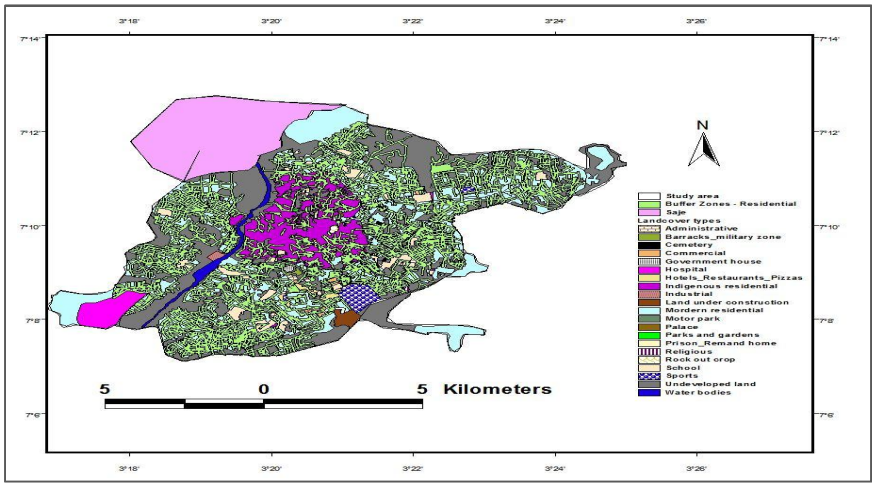

Figure 6 : Map of Study Area Showing the Residential/Land-Cover Buffered at 30m.

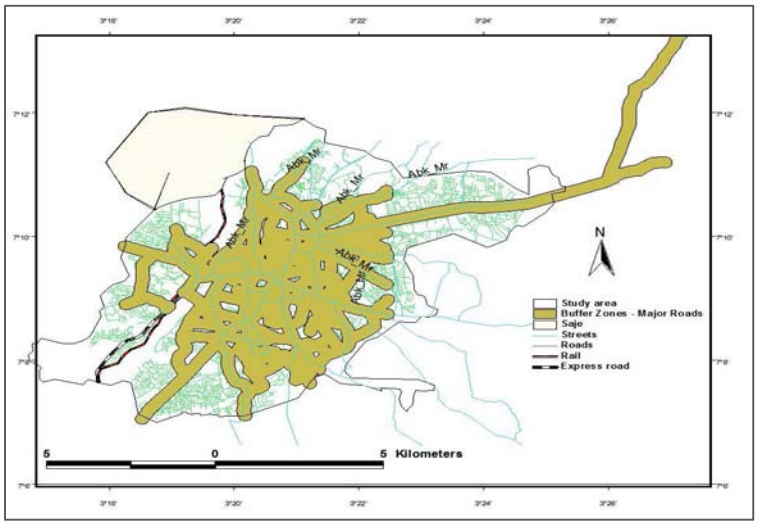

Figure 7 : Map of Study Area Showing the Major Roads Buffered at 200m.

Figure 8 shows the initial results of the buffering analysis; the candidate disposal sites (unbuffered areas) overlaid with important resources such as Ogun River, railway, express road and the other tributaries. It can be seen that some of the candidate sites are overlapping these important resources with economical / ecological value. Hence, these sites were digitized to exclude parts of the resources.

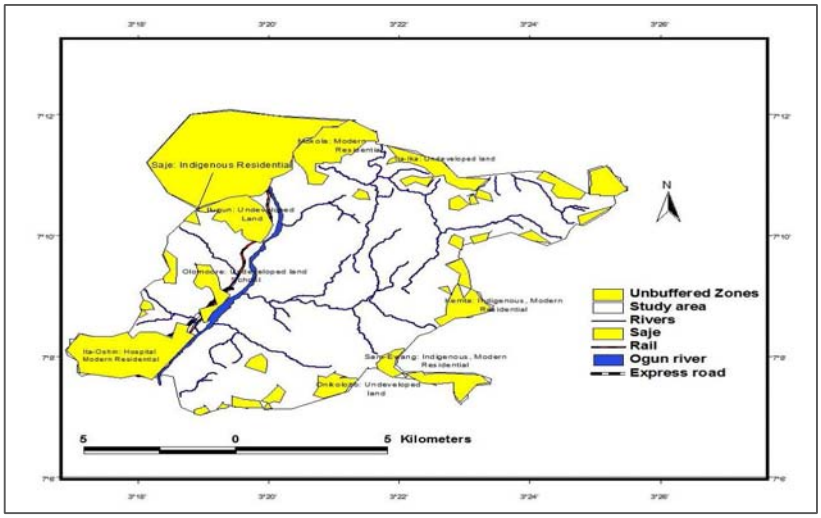

Figure 8 : Map of Study Area Showing the Candidate Disposal sites (Unbuffered Zones) Overlaid with Important Economic / Ecological Resources.

Figure 9 shows the combination of all the buffered zones, i.e. the drainages, land-cover and roads, and clearly illustrates the areas left 'unbuffered'. The areas left after buffering can be seen from the legends on the various maps. These areas are the digitized "candidate dumping sites" whichwere subjected to further analysis to determine the most suitable locations.

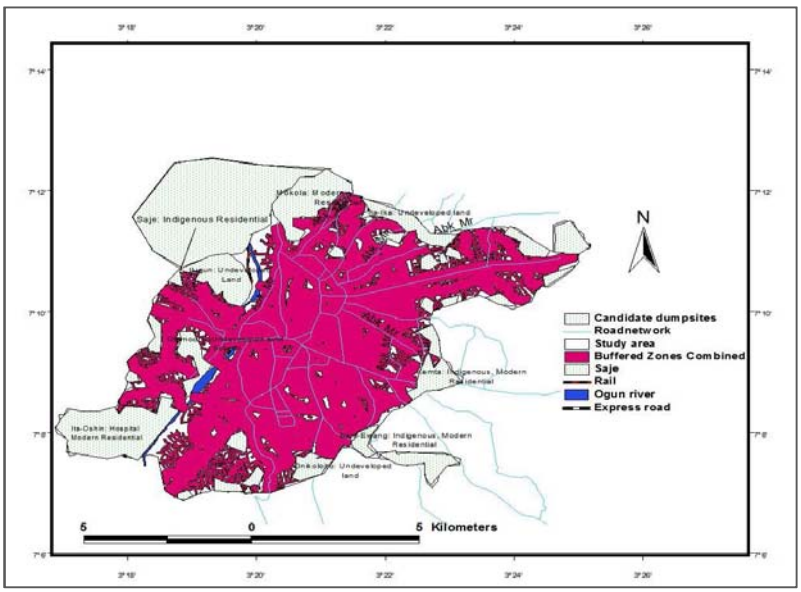

Figure 9 : Map of Study Area Showing the Combination of all the Buffered Zones and Candidate Disposal sites ("Unbuffered Zones").

e) Determining the Most Appropriate Disposal site Locations

The locations proposed as disposal sites in Abeokuta as shown in Figure 9 include *Saje*, *Ilugun*, *Olomore*, *Ita-Oshin*, *Mokola*, *Ita-Ika*, *Onikolobo*, *Sam-Ewang* and *Kemta*. The areas of the candidate sites are given as 12.06km2 for Saje being the largest site; 4.64km2, 2.66km2, 2.14km2, 1.47km2, 1.47km2, 1.44km2, 0.87km2 and 0.71km2 for Ita-Oshin, Mokola, Ilugun, Ita-Ika, Sam Ewang, Kemta, Olomore and Onikolobo espectively.

Saje, with an area of 12.06km2 and an indigenous residential area located far away from any resource of economical / ecological value, can be described as one of the most appropriate site. *Ilugun* has an area of 2.14km2 and is described as an undeveloped land. It is however situated some few kilometers near a railway station and is not readily accessible.

Olomore has a small area of 0.87km2 and overlaps the railway station, express road and the Ogun River and is described as "undeveloped land".

Ita-oshin with a fairly large area of 4.64km2 is described as a modern residential area and has a notable hospital. It is also overlapping the railway station, express road and the Ogun River which are resources of important economic / ecological value.

Onikolobo and *Ita- Ika* are areas described as 'undeveloped land' with areas of 0.71km2 and 1.47km2 respectively and located away from resources of economic importance.

Sam Ewang, Kemta and *Mokola* have areas of 1.47km2, 1.44km2 and 2.66km2 respectively and consist of indigenous and modern residential areas with no attachment to any resource of economic / ecological importance.

From the descriptions above, the most appropriate sites are given in Figure 10 as follows: *Saje, Ita-Oshin, Sam-Ewang,* and *Ita-Ika*. The total area of the four most appropriate sites is 19.64km2 out of a total area of 79.95km2 for the study area.

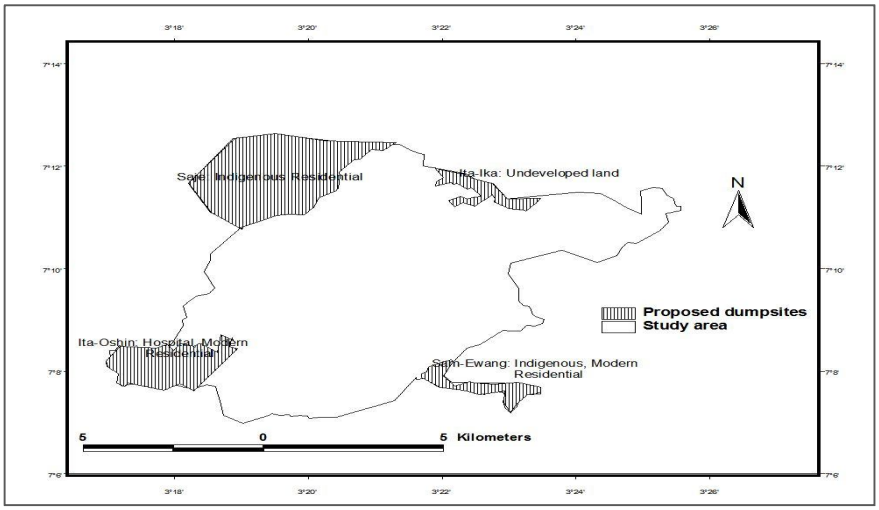

Figure 10 : Map of Study Area Showing Locations of the Proposed Disposal sites in Abeokuta.

f) Determining the Shortest and Least Cost Routes

The proposed transport routes are depicted in Figure 11. These gave directions which are the shortest distances between the proposed disposal sites and are also cost-effective. It was found out that the first "stop"is Saje and it is cost-effective to travel through Ita-Ika and Sam-Ewang before making a final stop in Ita- Oshin and vice-versa if Ita-Oshin becomes the first stop.

The total cost for the "stop" routes which is the shortest route that connects the stops is 27.30km while the total cost to make a round-trip (Tour Route Cost) is given as 36.00km.

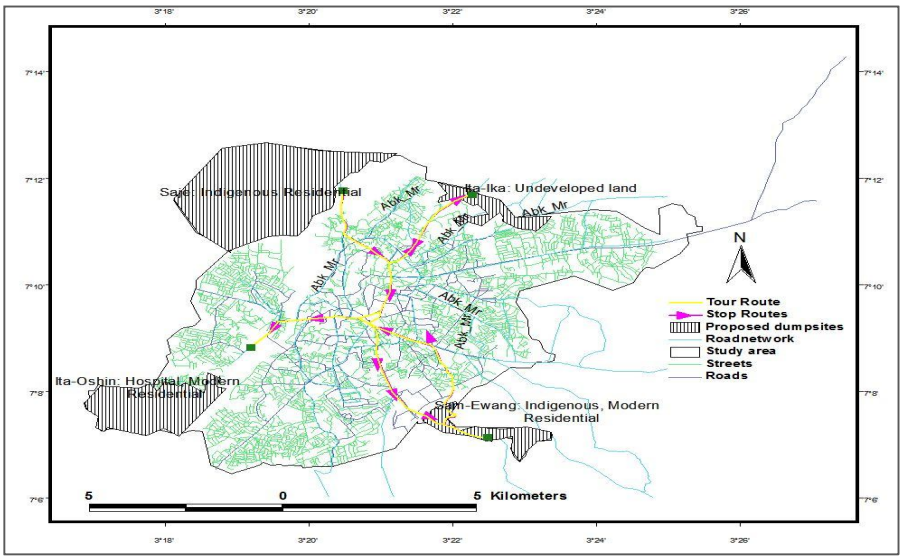

Figure 11 : Map of Study Area Showing the Proposed Transport Routes in Abeokuta.

g) Discussion

The arbitrary and indiscriminate siting of disposal sites in Abeokuta has led to the creation of so many patches of unsightly mountains of refuse scattered around the city. Four major areas which are Saje, Olomore, Ita-Oshin and Totoro are currently regarded as legal disposal sites while the others are termed as arbitrary. Burning still remains the most applied method of waste disposal especially for the illegal disposal sites, because the frequency at which waste is burned is higher when compared to that of the legal disposal sites (Ogwueleka, 2009).

The final selection of the disposal sites after various analyses in ArcView is influenced by several factors including the size (area) of candidate sites, nearness to resources havingecological / economical importance, accessibility to roads and type of development activities that have taken place in such a location (Adeofun et al, 2006; Sani et al, 2010 and Sener, 2010).

Saje, one of the proposed sites, is preferred for its large size and distance from areas with important economical/ecological value; and will serve *Ilugun* and *Mokola* which were initially selected but later eliminated. *Ilugun* and *Mokola* were eliminated during the selection process because they were closely located to *Saje* which is large enough to serve the areas. Furthermore, *Ilugun* is overlapping the railway, Ogun River and express road and would not be large enough if any attempt is made to reduce it farther away from these obstacles; it is also not on the road network i.e. not currently accessible to other locations.

Sam – Ewang is another proposed site lying between *Onikolobo* and *Kemta* which were both eliminated as well due to the clustered nature of their locations. It is therefore intended that *Sam- Ewang* will serve both locations as it lies in-between and is accessible from both locations. *Ita-Oshin* was favoured in the selection process even though it overlaps some obstacles because of its large area. It is therefore advised that about 1.5km – 2km of its 4.64km should be carved out from the obstacles before siting the disposal site in the area. It will also serve Olomore area which was initially selected but later eliminated because of its nearness to resources of important value and very small size.

Determining transport routes for waste collection and transportation services is very essential in order to reduce travel costs and increase efficiency in transferring wastes to disposal sites (Ogra, 2003). The most appropriate route from the starting point, *Saje,* is through *Ita-Ika, Sam-Ewang* and finally to *Ita-Oshin* and vice-versa.

IV. Conclusion/Suggestions

It has been demonstrated beyond every reasonable doubt that GIS is a very important tool for determining the most appropriate locations for siting disposal sites and finding the least-cost travel routes for waste transportation and disposal. Therefore, the proposed disposal sites should be considered as appropriate waste disposal / landfill sites and as such, approved for location. Locating disposal / landfill sites should not be arbitrary and its management should be deliberately planned and consistent to ensure a continuous and efficient waste management program. Transport routes should be short to allow for multiple trips, efficiency in waste collection and transportation and cost-effectiveness. Also, the following recommendations are made:

- *Saje* disposal site should be retained and considered a possible location for siting landfill.
- *Olomore* and *Totoro* disposal sites should be relocated while *Sam-Ewang* and *Ita-Ika* disposal

sites should be upgraded and made to function as legal waste disposal sites.

- The road network should be expanded to enable a wider coverage of inaccessible areas for efficient waste collection and transportation.

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New Public Sphere in an Emerging Global Polity: Prospects for the Issue of Climate Change

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Abstract - State has generally been considered, internally and externally as the most powerful independent political authority. However, it has to engage with civil society and public sphere, the two significant components of nation-state polity at home. Globalization has profound impact on this power structure and shifted it to global level. Globalization also brought with it mundane issues like climate change which the state alone is incapable to cope with. Several powerful states and MNCs even become obstacle in fighting it. Civil society organizations (CSOs) with their limited resources are combating this issue that threatens human existence on this planet. However, ICTs enabled new public sphere brings in a ray of hope by opening new prospects for CSOs to deal with this threat. This article is meant to juxtapose the diversity of research-findings into a compact piece of knowledge and show strengths of NPS for civil society in perspective of climate change.

Keywords : *Global polity, New Public Sphere, Global civil society, Climate change, information and communication technologies.*

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New Public Sphere in an Emerging Global Polity: Prospects for the Issue of Climate Change

Muhammad Zubair Khan[α], Dr. Allah Nawaz[σ] & Amanullah Khan Miankhel[ρ]

Abstract - State has generally been considered, internally and externally as the most powerful independent political authority. However, it has to engage with civil society and public sphere, the two significant components of nation-state polity at home. Globalization has profound impact on this power structure and shifted it to global level. Globalization also brought with it mundane issues like climate change which the state alone is incapable to cope with. Several powerful states and MNCs even become obstacle in fighting it. Civil society organizations (CSOs) with their limited resources are combating this issue that threatens human existence on this planet. However, ICTs enabled new public sphere brings in a ray of hope by opening new prospects for CSOs to deal with this threat. This article is meant to juxtapose the diversity of research-findings into a compact piece of knowledge and show strengths of NPS for civil society in perspective of climate change.

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I. Introduction

The rise of 'state' in Europe was primarily the need of that period, as it provided the best remedies to then existing problems of security both internally and externally, issues of rising markets, and a dependable system of law and justice (Beaulac, 2004). Travelling back into the history, the sovereign territorial states seem to have been a contingent product of a particular time and space (Ebo, 2007). The nation-state performed significant functions and provided an alternative "loyalty" to the existing ethnic and religious split in Europe at that time (Mossberger et al., 2007).

However, the state is increasingly enfeebled today (Ferguson, 2006). It finds itself bounded by competitors offering alternative rules and norms for world politics. The monopoly of state in international Arena is over; interstate relations are shifting to transnational realm. These transformations are marked by rising interdependence of the various transnational actors, and globalization reinforces this interdependence (Kapitonenko, 2009).

Many scholars believe that the process of transformation is initiated by economic forces that are seeking higher profits in the global space, and is facilitated by technological developments in the field of communication, transportation, media and production (Wriston, 1992). The essential peculiarity of globalization is that physical distance becomes irrelevant and that territorial boundaries become less significant (Scholte, 2000).

Moreover, a number of contemporary issues are global in their nature and solution. Among these problems, the most prominent is global warming which is characterized by the harm inflicted by unsustainable development (Grundmann, 2001). An in-depth consideration of the complexity of climate issue suggests that the climate issue cannot be addressed effectively without addressing the essentially environmentally hazardous dynamics of capitalism. Capitalist lust for profits transformed even living nature into dead commodities. The same forces facilitated the erosion of state power by freeing market from the state control (Bello, 2010).

Civil society has reacted more sharply than the state, to the issue of climate change at all the levels. Thousands of ENGOs are striving for environmental favors at local, national, regional and global level (Gemmill & Bamiele-Izu, 2002). These ENGOs take individual initiatives as well as work collectively (Newell, 2005). For example, climate action network (CAN), a network of around 700 NGOs struggling for environmental causes in over 90 countries around the world.

The advent of the Internet has provided these ENGOs with a variety of new tools and channels to further their cause and motivate public opinion on climate change. The most significant development is the rise of 'global human consciousness' in response to the mundane issue of the contemporary era (Tehranian, 2004). These new issues are providing common reference points around which a new 'publicness' is increasingly getting anchored. Climate change is one of

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the leading issues that have potential to raise this 'global publicness' (Castells, 2008). Civil society organizations (CSOs) are steering the debate on this issue and civic activities to achieve environmental goals by utilizing ICTs. So the new public sphere (NPS) has a lot of potentials for civil society to deal with this threat.

II. Emergence of Global Polity

Merriam Webster defines polity as a "form of politically organized unit". The term 'polity' is interchangeably used for 'state' and 'government'. However, 'polity' in Aristotelian sense refers to a regime or a rule. Regime does not necessarily mean 'state', it refers to norms, principles and procedures (Krasner, 1983c), which shape a socio-political whole, with its various elements, the relationship among these elements and the basic norms governing these relationships. The core concern in this relationship remains the aspect of 'power'. The norms of a polity ensure responsible exercise of power. So 'polity' refers to a social formation, a larger whole in which 'state' is also accompanied by other pillars of power in this formation (Polanyi, 1944). The 'state' denominates a political society/sphere (Gramsci, 1971), distinct from market and family-the realm of private. Between the two lies 'civil society' which has the power to mediate between political sphere/society and the private sphere (Habermas, 1989). Yet another realm, 'public sphere' facilitates civil society to mediate with state and market to attain favors for individual and family, and completes the social whole. Market, though part of the realm of the 'private', have the potential to exploit individual and family, so civil society steers this later part of the 'private' along with its associations to form a 'public sphere' to bring the state and market in touch with needs of the 'individual and family' at large. So three overlapping spheres of power i.e. state, civil society and public sphere constitute the whole and forms what may be termed as nation-state polity. Market serves as a powerful intervening variable in this relationship.

The emergence of 'state' has been attributed with the Westphalia treaty however, the polity of nation-state as we see today developed gradually in the post Westphalian period. The power shifted from Pope and feudal lords to monarchs and bourgeois class and eventually the democratic systems emerged which involved the common citizens through the mechanism of elections to provide legitimacy to emergent polity (Slavin, 1964). State dominated the international arena as the supreme authority for the last two centuries. However, since the process of globalization got pace, the Westphalian structure of polity seems to have been challenged.

Globalization is a set of ongoing processes, without a beginning or an end, motivated by human instinct for improved style and standard of living, forcing connections among all types of institutions and organizations, resulting in destabilization and integration simultaneously and chronically. There is no space to explicate the debates regarding globalization. Globalization, we suppose is not entirely a new phenomenon. However, the contemporary technology led globalization is something unmatched and unprecedented in history. Technology led globalization has a profound impact on the nation-state polity. Globalization due to its macro and micro processes is acting as a catalyst for a societal change. No section of society, economy and politics is saved from the transformatory impacts of globalization (Manivannan, 2008).

ICTs are the creator and facilitator of contemporary globalization which is the process that shapes a social system with the capability to work as a unit on earthly scale in real or chosen time (Castells, 1996). Capacity here refers to technological, institutional, and organizational capacity (Held et al., 1999). These processes have shifted the debate from the national to the global realm, and prompted the rise of a global civil society (GCS) and of informal structures of global governance. Consequently, the public sphere as an arena of debate on public issues has also moved from the national to the global level. The rising inability of nation-states to face and control the processes of globalization of the issues that are the purpose of their governance leads to ad hoc shapes of global governance and, eventually, to a new form of state. However nation states, despite their multidimensional crisis, do not vanish, instead they transform themselves to adjust to the new context. Their transformation is what really transforms the current character of politics and policy making (Castells, 2008).

The nation-state based polity is drastically influenced by the ICTs led globalization amounting to a transformation. This transformation on the one hand has relocated the centers of power from national to global level, and on the other, has been compelling to redefine the conditions of interplay among the constituent elements of the new polity. The argument refers to the fact that 'state' capacity to deal with the contemporary issues has decreased and that the new actors have come forth to fill the gap (Kobrin, 2001). Civil society and public sphere, comparatively weaker elements of nation-state based polity, have now become powerful and have extended beyond the nation-state boundaries (Crack, 2007).

So the emergent political structure at global level reflects three major components. A new public sphere (NPS) which is transnational in nature and is anchored around global communication networks. The second component of this political structure is 'global' civil society which is an organized expression of the norms, values and interests of global society (Keane, 2003). A network state is the third component of the

global polity which is reflected in the emerging global governance structures (Castells, 2008).

III. New Public Sphere

"Public sphere" lies between the state and civil society as a network to communicate information and different points of views (Habermas, 1996). The public sphere is an indispensable constituent of sociopolitical organization. It is the arena which provides the people the opportunity to come together as "citizens" and express their independent opinions which can have impact on the political setup of the society (Habermas, 1989). Civil society is the ordered manifestation of these opinions and the association between the state and civil society is the keystone of democracy. The state may drift away from its subjects if there is no civil society capable enough to structure and channelize citizens' discussions over varied topics and conflicting issues (Castells, 2008).

The contemporary information society and knowledge industries are characterized with the removal of all the temporal and spatial challenges to distanced communication with the help of ICTs. The peculiarity of the technologies of the network society is that they do not just extend conventional communication media, rather these are entirely different in terms of their structure, speed, and scope (Crack, 2007). The NPS is rising out of the information technologies initiating from a 'computer' then linking them into 'Network', which initiated within a building, then extended to cities, states and eventually 'global-networks' emerged with the gadget of 'Internet', a global platform that provide opportunity to every citizen to become a 'global-citizen' (Chan & Lee, 2007).

The public sphere that was once, woven around the national institutions of territorially bounded societies has moved to a public sphere anchored around the modern media system (Volkmer, 1999). This modern media system is based on networks of communication that enable many-to-many two-way exchange of messages in a multimodal shape of communication that can even bypass mass media and avoid state control as well (Crack, 2007). These ICTs have enhanced dialogic prospects between geographically scattered and distinct actors, thus have provided the opportunities to extend public spheres beyond the realm of nation-state (Castells, 2008).

The NPS supplies new opportunities for stimulating an active and attentive 'public' (Oblak, 2002). These information civilization innovations are shaping a new global consciousness, founded on growing "awareness of the world's ecological and economic interdependence, cultural clashes and the need for dialogue and democracy" (Tehranian, 2004). This consciousness provides the basis for the rise of global 'public' joined together as a virtual body by a sense of global affinity which springs out in response to mundane issues of the twenty first century. This 'affinity' substitutes the 'common' interests which were defined in the nation-state context in Habermas theory that brought private citizens together to form a public body. As the mundane issues today are global in nature, therefore the emergent 'affinity' is equally global. However this affinity would be effective when there would be more and more terms of references (Crack, 2007).

The issue of climate change provides one of such reference points that have the potential to bring the citizens from around the globe together as a single public. The technologies that enabled NPS provide unlimited opportunities to citizens and civil society, striving to deal with this issue.

In perspective of climate change, one can observe the components of transformed polity. NPS on the issue of climate change exists in the shape of blogs, facebook pages, bulletin boards, and unlimited websites that provide the basic information on the subject and stimulate debates. One can also observe a vibrant global civil society striving to combat the rising temperature of the planet Earth. Among such organizations, prominent are the Climate Action Networks (CANs), World Wild Life Fund, Friends of Earth International and Greenpeace. Similarly, there are a huge number of environmental laws, and regimes along with global governance structures like UN International Panel on Climate Change (IPCC). So the three structures of nation-state based polity can be observed on this particular issue on global level.

IV. Prospects for Climate Change

Climate change is a variation in the statistical properties of the environmental system when measured over long periods of time, regardless of cause (IPCC glossary). However, the term is particularly used to point to human induced climate change, contrary to natural changes in the Earth's environmental system (UN Framework Convention on Climate Change, 1994). This term has become identical with anthropogenic global warming in perspective of sociopolitical environmental debates. Global warming is described as increase in Earths' surface temperature. Climate change encompasses global warming and everything else that gets affected by the greenhouse gases (NASA, 2011).

The enormous consumption of fossil fuels that release huge amounts of greenhouse gases cause global warming. There is a scientific consensus that this would change climatic patterns both for humanity and other living beings on the Earth (Oosthoek & Gills, 2005).

Climate change is one of such issues that can motivate 'public' consciousness on planetary scale (Tehranian, 2004; Crack, 2007). This global

consciousness is increasingly enhanced by the facilities provided by information and communication technologies. The availability of information on issues relating to climate change added by the raised capacities of civil society to steer debate, and stimulate public actions to influence public policies is helping the cause of environmentalists (Castells, 2008).

a) Motivating Global Opinion

The popularity of ICTs in human activity requires that the notion and reality of the current popularity of social media be considered in the climate change crisis (Kazlauskas & Hasan, 2009). ICTs facilities like the Internet, cell phones, community and interactive radio that are easily available across the world, offer extraordinary opportunities to improve the generation, management and sharing of information about climate change (Ospina & Heeks, 2011).

CSOs are increasingly using ICTs to disseminate information about climate change and motivate public opinion. Various successful e-campaigns actually provide the evidence for motivated citizenry across the globe. Several examples from the activities of ENGOs are worth consideration in this perspective. Greenpeace holds the world record for maximum comments on a Facebook page in a single day as its page Unfriendly Coal attracted record 80,000 comments in on April 14, 2011 (Greenpeace, 2011). This was part of the 'unfriendly coal' campaign to compel 'facebook' to turn to renewable energy. After campaigning for 20 months to green Facebook, the website finally agreed to run on clean, renewable energy.

Similarly, Kit Kat campaign was another social media facilitated campaign that persuaded Nestle to agree to removing products that resulted in the destruction of rainforest in Indonesia. The campaign used a 'video' to motivate public to boycott Kit Kat Choclate as its production negatively affected certain Indonesian forests, thus initiated a vibrant debate on social media. Various CSOs negotiated with the Nestle, and eventually Nestle agreed to stop such production that was harmful for rainforests (Petersson, 2010).

Equally powerful tools are interactive radio and community radio. ENGOs are utilizing both of these facilities for environmental purposes (Kalas & Finlay, 2009). World Association of Community Radio Broadcasters (AMARC) initiated various environmental projects in different countries. Community radios in Madagascar, Peru, Uruguay and Argentina are some of their successful projects (AMARC website). Interactive radios are rapidly becoming popular. Public interact with the broadcasters via cell phone, SMS, email, Social Networking Sites. Furthermore, many ENGOs have established their interactive radio stations (Kalas & Finlay, 2009).

Moreover, global public opinion surveys also show the concern of citizens across globe. There seems to be a universal consensus among the citizens living in different parts of the planet earth that climate change is a serious threat that needs to be addressed immediately. The polls show that people are even willing to deal with this issue at the cost of their budgets. Of course exceptions do exist, just as exceptions exist in any territorial society. However in general, one can see the rise of global consciousness on the issue of climate change (World Bank, 2009). It is not argued that public opinion about climate change is solely determined by the ICTs, however, the potential significance of ICTs in this process can not be underestimated.

b) Engaging citizens

ICTs have immense potential to enable civil society to get citizens engaged in the struggle to combat this issue. This engagement can be in the shape of individual or collective green actions. ICTs particularly cell phone has made it easy and swift to communicate to citizens and motivate them for any action. The Billion Acts of Green (BAG) campaign is a good example of how ICTs can raise civic engagement for the environmental cause. The BAG campaign is a transnational effort meant to encourage simple actions on behalf of the planet in the shape of commitments from individuals and organizations to exhibit the collective power of service to the planet. The campaign was launched by the Earth Day Network on the eve of 2010's Earth Day, the BAG utilized social media that facilitated enhanced public participation in this global effort. Facebook and twitter apps encouraged users to promise at least one "act of green" and share it with members of their social network. The BAG campaign was extremely successful, and succeeded in registering over 5 million pledges (website of the campaign). BAG is still functional on facebook and is discovering innovative ways to help this cause from the global public.

Greenpeace campaign to protect Argentina forest is another good example in this perspective. Greenpeace observed that 300,000 hectares of area is deforested in Argentina each year. To address this issue, Greenpeace Argentina used social media and conventional media to gather 1.5 million signatures for a petition to support La Ley de Bosques, or the Forest Law (Kinkade & Verclas, 2008).

Through a form on the Greenpeace website, individuals were required to submit both email ID and cell phone number, and sign a petition that supported the Forest Law. Greenpeace succeeded in collecting around 300,000 phone numbers, moreover 50,000 other numbers were collected through other means. Greenpeace remained successful in collecting over 1.5 million people that signed the petition supporting the Forest Law (Kinkade & Verclas, 2008). Charity: Water Twestival is another successful example of citizens' engagement for environmental cause (Website of the campaign).

c) Enhancing CSOs capabilities

CSOs have been the most active defenders of the planet earth. Though 'states' have more resources than these organizations however these have the 'will', 'expertise', 'reach' and 'networks' required to further this cause (Gemmill & Bamiele-Izu, 2002). Though, civil society's participation in global environmental governance has improved the process and brought positive results in a variety of ways, however, keeping in view the fact that ENGOs have to struggle against states and MNCs, the world largest polluters, the resources available to these CSOs are extremely limited (Newell, 2005). Furthermore the existing socioeconomic differences between ENGOs of North and South pose challenges to any efforts for combating the causes of climate change (Petersson, 2010). The advent of ICTs facilitated the enhancement of the capabilities of CSOs. Generally speaking, social media have become a coordinating tool for political movements across the world (Shirky, 2011).

ICTs have strengthened CSOs to perform several significant functions regarding climate change; providing expert advice and analysis, intellectual struggle against state, mobilizing public opinion, representation of the citizens, monitoring, assessing and legitimizing global-scale decision making processes (Gemmill & Bamiele-Izu, 2002).

These days nearly all NGOs utilize the Internet for internal communication; for shaping public opinion through their websites; for improving member services by supplying them a greater amount of information; for communicating swiftly at lower cost; for recruiting new members and for soliciting financial support; for disseminating informational resources to governments and the public; for raising public awareness and for mobilizing citizens to become politically involved; and for realizing innovative ideas (Petersson, 2010).

d) Monitoring Carbon emission and formulating adaptation plans

Despite enhanced role of CSOs in combating climate change, it has been the states that mostly monitored the carbon emission and formulated adaptation plans due to its monopoly over technologies, resources and political authority. However, with the advancement in technologies and transformation in the power structures, CSOs are increasingly acquiring capabilities to monitor the carbon emission and shape effective adaptation plans.

MobGAS, a mobile application can be utilized for tracking individual emissions of greenhouse gases. This application was designed by scientists at the European Commission's Joint Research Centre. It can track the emissions of gases like carbon dioxide, nitrous oxide, and methane based on information on daily activities entered by the user. Users can enter this information on a website or their cell phone and then compare their emissions with national and international averages (Kinkade & Verclas, 2008). Citizens can know about the emissions caused by watching television, driving, or cooking at any time. By creating a link between their users' daily activities and greenhouse gas emissions, mobGAS can encourage individuals to change their lifestyle. The application also provides tips on how to adjust activities to reduce emissions. MobGAS was downloaded over 3,000 times between December 2007 and February 2008. MobGAS due to its potential to raise individuals' awareness of emission can facilitate higher-level change (Kinkade & Verclas, 2008). A variety of such devices are facilitating CSOs in pursuit of their goals.

Adaptation plans to combat environmental issues demands a partnership between public, private and civil sectors. ICTs enable multiple actors to get involved in the design of adaptation strategies at all levels, from simple broadcast and opinion shaping on various issues to be decided, to enhanced engagement by means of social media and online polling of those who are expected to be affected, to the use of group decision support systems to model and analyze various scenarios, and facilitate decision making (Ospina & Heeks, 2011).

e) Pressurizing State and MNCs

ENGOs network inform and persuade individuals and government by generating and disseminating relevant information. These pressurize governments to make certain changes by either holding them answerable for existing laws, or shaming their particular behaviors with ethical demands for social justice (Custard, 2008). ENGOs can be referred to as "watchdogs for the global commons". These strive to make both state and businesses accountable. These have become now stakeholder with the 'state' in environmental governance and have been very actively participating in environmental legislative forums (Petersson, 2010). ICTs are facilitating ENGOs in performing this function.

Usage of social media to pressurize state, and particularly to rally support on the eve of major economic and political forums have become quite common (Castells, 2008; Crack, 2008). Businesses are also coming stress from the innovative use of social media by ENGOs. Cell phone based one of such initiative is the Climate Counts USA, which facilitates citizens to check companies' environmental sustainability ratings, and then compare them with their competitors. This information is sent back to a consumer in the shape of a scorecard via text message, which shows the self-reported efforts of businesses to address environmental issues. Climate Counts has produced an index based on whether these companies have considered their climate 'footprint,' decreased their impact on global warming, supported climate friendly

legislation, and openly exhibited their climate actions. This service is funded by U.S. yogurt company Stoneyfield and powered by Mobile Commons (Kinkade & Verclas, 2008).

V. Discussion

It would be oversimplification to consider climate change as just an environmental issue because it is the consequence of modern economic systems, and our contemporary living style. The politics of climate change is marked by scientific uncertainties, north-south divide, different approaches of coastal and mainland states, role of TNCs and certain social issues as well. Furthermore, it is a matter of resources, expertise and access to centers of power for ENGOs which highlights the fact that ENGOs struggle for environmental goals itself is marked by differences (Newell, 2005). These offline differences also influence NPS and as a result, its efforts to win favors from national and global political authorities.

However, it is important to note that the politics of climate change is cosmopolitics and any genuine effort to bring this issue to its logical conclusion requires a post nation-state approach (Gills, 2008). It also ushers in an opportunity to prove the existence of a single human race on planet earth, striving to safeguard its motherhood. However, the existing socio-economic differences between north and south publics, and their civil society actors results in fragmentation in public sphere. As a result multiple public spheres emerge on the subject, with different aims and approaches to deal with this issue.

These challenges have multiple effects on NPS on climate change. The north-south divide at the very global level can create fragmentation in the public sphere. The existing socio-economic differences within a state can further create groups with different approaches on this issue. Moreover the works of skeptic scientists can also misguide the public and produce false public opinion. As a result of these challenges, the fragmented public sphere on climate change becomes weak in pressurizing political authorities at national and transnational levels to act decisively on the drastic threat to the planet earth.

ICTs potentials get undermined by the existing digital divide which is actually yet another reflection of existing socioeconomic divides (Papacharissi, 2002). However, in this perspective, cell phones offer unique opportunities to ENGOs for staying in touch with their members as well as with the public in general (Bahague, 2008). Around 6 billion cell phones are in use across the world (ITU, 2012). Mobile phone technology is very extensively used by NGOs these days. It enables CSOs to generate awareness, initiating public discourse, collect environmental data and to perform several other functions (Kinkade & Verclas, 2008).

VI. Conclusion

The process of 'polity' formation at transnational level is underway. The elements of the nation-state based polity may find similar matches at global level but based on different footings. One can observe the emergence of transnational public sphere, GCS actors and of course emerging global governance structure woven in a larger framework beyond nation-state. This requires the need for new lenses to see the world as a unit itself, as a grand polity, having three distinct spheres that reinforce each other beyond nation-state and negotiate with each other to coupe with various issues faced by the Planet Earth.

The NPS being entirely different from conventional public sphere in its nature, structure, vastness and mechanisms is shaping public opinions in its own way by infusing the feelings of 'global citizenship' in its activists. Global civil society organizations are utilizing this opportunity for public opinion generation on climate change by initially providing the global citizens with the required information and more importantly by involving them in global campaigns with disregard to territory.

ICTs have ushered in a new era of opportunities for global civil society to cope with the issue of climate change. ICTs dire problem-the digital divide is being checked by the ICTs emerging capability of integrating communication technologies. Today, billions of people get access to information and their network via cell phones along with the Internet. Similarly new opportunities like interactive radio & television are opening up new avenues for ENGOs and are proving to be a setback for the proponents of 'digital divide'. The NPS is facilitating global civil society to play effective role in the planetary governance.

However, it should also be emphasized that ICTs alone can not create a vibrant global public sphere on any issue. In order to achieve concrete result on this issue various concerns should be addressed. The existing north-south divide in socio-economic development is one of the major hurdles in achieving such noble ends. The environmental problems related with the modern lifestyle can be addressed through schooling and public sphere discussions leading the way to convince policy makers at the top.

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Global Warming: A Titanic Problem

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Introduction - Global warming is one of those areas of science that gets all sorts of people exited. Though a few ask for more and more evidence that global environmental change is taking place, most accept that human activities are causing changes quite unlike any. But what exactly is it. Is it natural? Why is it happing? And what is it doing? The planet we inhabit is blessed with some very special conditions that just happen to be perfectly suited to sustain life. Global warming is the increase of average world temperature as a result of what is known as the greenhouse effect. Certain gases in the atmosphere act like glass in a greenhouse, allowing sunlight through to heat the earth`s surface but trapping the heat as it radiate back to space. As the greenhouse gases build up in the atmosphere the earth gets hotter. Organization related to this have quickly realize this and since 1980 have seen a huge research effort to explain the probable effects on our environment. The research continues, as we try to discover what rates of change can be tolerated.

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I. Introduction

Global warming is one of those areas of science that gets all sorts of people exited. Though a few ask for more and more evidence that global environmental change is taking place, most accept that human activities are causing changes quite unlike any. But what exactly is it. Is it natural? Why is it happing? And what is it doing? The planet we inhabit is blessed with some very special conditions that just happen to be perfectly suited to sustain life. Global warming is the increase of average world temperature as a result of what is known as the greenhouse effect. Certain gases in the atmosphere act like glass in a greenhouse, allowing sunlight through to heat the earth`s surface but trapping the heat as it radiate back to space. As the greenhouse gases build up in the atmosphere the earth gets hotter. Organization related to this have quickly realize this and since 1980 have seen a huge research effort to explain the probable effects on our environment. The research continues, as we try to discover what rates of change can be tolerated.

II. The Greenhouse Effect

It seems obvious that the main cause of this is the sun and the heat it sends hurtling our way. But the irony is that the sun`s energy by itself is not sufficient to make the planet warm enough for us to live on. The reason the earth is at just the right temperatures for human and other species to develop and thrive is because of a miracle called the "greenhouse effect". It is this phenomenon that keeps temperatures on the earth surface averaging 15°C. Without it the temperature would be -20°c –a cold that humanity would never have been able to evolve. Like the other planets in our solar system, the energy that the sun constantly emits strike our world, warming the surface. Because of the presence of atmosphere having almost perfect composition that can surround our earth like a blanket and that is held in place by gravity, there is the sustainability of life. Venus, for instance, has a thick atmosphere (thicker than the earth), which is composed mostly of carbon dioxide. Combined with it`s closeness to the sun the carbon dioxide levels on Venus send temperatures soaring to 460°C.

On an average the energy of the sun`s radiation on the top of the earth`s atmosphere is 1355w/m^2 (the solar constant). The effect this has on the earth`s climate is called the solar forcing of the climate system. This varies from season to season and on a larger timescale. At the earth`s surface on a sunny day the incident energy would be about 1000w/m^2. The greenhouse can be considered as an additional forcing factor, as it prevents some radiation from escaping to space.

It is clear that the evolution of the earth`s atmosphere has been intimately linked with the development of life on earth. Today both biological and geochemical processes are involved in maintaining its composition, but one species, human, has now become so numerous that it is beginning to affect the composition of the atmosphere and shift it from its natural equilibrium. The greenhouse effect changes the way the sun impacts the earth. The greenhouse effect is due to the presence of greenhouse gases.

III. The Greenhouse Gases

Water vapour is one of the most important greenhouse gases but its role is a bit complicated one. When water vapour condenses into clouds it can either absorb long-wave radiation from the ground causing further warming or reflects radiation from the sun causing a cooling effect. Which of these predominates depends on the type of clouds and its height in the atmosphere. Absorption of radiation is a property of a wide range of gas molecules, including carbon dioxide, methane, chlorofluorocarbon, nitrous oxide and sulpher dioxide, but among them carbon dioxide is the most important. These are all long-lived greenhouse gasses.

One of the main greenhouse gases is carbon dioxide (CO_2), which contributes about 50% to the greenhouse effect. The primary source of the increase in carbon dioxide is use of fossil fuels, but land-use changes also make remarkable contribution to it. Since prehistoric times people have burnt wood and other plant remains to produce heat and light. As wood become scarce, the use of coal became increasingly important and ultimately oil and gas. The demand of energy increased sharply and this demand was largely met by the increased use of fossil fuels (coal, oil and gas) and ultimately releasing more and more greenhouse gases to the atmosphere, particularly carbon dioxide (CO_2). The burning of fossil fuels is not the only way in which CO_2 can be released into the atmosphere. It is also produced in large amounts as a consequence of land-use change. Before the industrial revolution the rise in the concentration of CO_2 can be

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largely ascribed to deforestation, and agricultural land-use. Till now 20% of the released CO_2 (carbon content only) has been contributed by land-use changes. Land-use changes can release CO_2 into the atmosphere by causing oxidation of carbon compounds in the vegetation or the soil. Due to deforestation, there is an increase in soil erosion, which exposes organic matter to rapid oxidation, which ultimately becomes the source of carbon dioxide.

The ability of gases such as carbon dioxide to trap heat that creates the so called greenhouse effect. Without it, the sun`s energy would just enter the planet, or bounce off it. In the case of Venus, there is clearly too much heat-trapping carbon dioxide to sustain life. On earth, though, this heat trapping gas makes up only a small amount of what is in the atmosphere 0.03% or so. The small levels of "greenhouse gases" in the earth atmosphere are enough to heat up the planet`s surface making for human to survive. But when the composition changes, it would influence our climate or weather. We all know how fast the weather can change.

Carbon dioxide (CO_2) is necessary for the growth/survival of plants. But deforestation is now out of control. For example in 1987 an area of the Amazon rain forest, the size of Britain was burned, adding 500 million tones of (CO_2) to the atmosphere. The recent fire in Indonesia (1997), with more than a million hectares of forest was burned. The lost of forest also means that there are fewer trees to absorb CO_2. However, deforestations cause less than half the yearly total of CO_2, the rest comes from the burning of coal, oil and other fossil fuels. As far as electricity is concerned that is created mainly from burning of coal and oil. Every time we switch on a light we are adding to the greenhouse effect. The average European is responsible for nearly 2.5 times as much atmospheric carbon as a Latin American. The concentration of carbon dioxide has increased 25% since the industrial revolution. Half of this rise has been in the last 30 years. It is expected to double within decades if it is not checked. As a feedback processes, about half the CO_2 released by burning fossil fuels is absorbed by the oceans. It is taken by minute sea creatures or dragged to the ocean depths by the circulation of water. Recent research suggests that as the earth heats up, the ocean will be less efficient in absorbing CO_2, living more in the atmosphere and so adding further to global warming. It is because, observations since 1961 show that the ocean has been absorbing more than 80% of heat added to the climate system, and that ocean temperatures have increased to depths of at least 3000m. That's why the efficiency of absorbing CO_2 by ocean has been decreasing. The other green house gases are methane (CH_4), chlorofluorocarbon (CFCs), nitrous oxide (N_2O) and sulpher dioxide (SO_2). It is observed that carbon dioxide, methane, and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values.

The concentration of methane in the atmosphere is rising at a fast rate. It is produced by anaerobic respiration in a wide variety of environment, such as the stomachs of animals, swamps, paddy fields, waterlogged soil, the release of natural gas from landfills and vegetation rotting in the absence of oxygen. A considerable amount is also produced during mining and oil/natural gas extraction. Methane is constantly removed from the atmosphere by reaction with hydroxyl (OH) radicals in the air and by the activity of soil organism. The problem with methane is that as the world population increases, agricultural activity must increase for the sake of sustainability and ultimately the emission of methane also increase. Since 1960 the amount of methane in the atmosphere has increased by 1% per year – twice as fast as the built-up of CO_2. A methane molecule is 30 times more effective in trapping the heat than CO_2 molecules. Methane molecules survive for 10 years in the atmosphere. As the world warms it causes feedback processes. The large quantities of methane stored in the frozen tundra of the north may be released. Methane trapped in the sea bed may also be freed by temperature rises. Increase in temperature cause the liberation of CO_2 and methane which ultimately cause further warming.

Nitrous oxide contributes about 6% to the greenhouse effect at the moment. It comes from both natural and man-made processes. Nitrous oxide is contributed about 45% by man influenced sources mainly through fossil fuel consumption, nitrogenous fertilizers, burning rain forest and animal wastes. Atmospheric concentration is quite low at around 0.31 ppmv, and they are rising much more slowly than methane.

Chlorofluorocarbons are extremely effective greenhouse gases. Although there are lower concentrations of CFCs in the atmosphere than CO_2, they trap more heat. A CFCs molecule is 10,000 times more effective in trapping heat than a CO_2 molecule. CFCs molecule survives for 110 years because it is very stable and decay slowly. CFCs rise and gradually accumulate in the stratosphere where they are broken down by the sun's ultraviolet light, so releasing chlorine atoms. Chlorine attacks the ozone (O_3); one chlorine atom can help to destroy 100,000 ozone molecules. So it is necessary to achieve the global phase-out of CFCs at the earliest. It is this that causes people to want to ban them completely. CFCs have been identified as the cause of the destruction to the ozone layer, which is also a greenhouse gas. They are found in refrigerators, air conditioners, asthma inhalers, packaging and propellants in aerosol spray.

Although SO_2 is a greenhouse gas its accumulation in the atmosphere has probably had a net cooling effect. SO_2 released in the gas phase is

converted to aerosol particles of sulphate. These aerosol particles absorb short-waves radiation. These particles are the main condensation nuclei for water vapour, which ultimately become the source of clouds. Sulphate aerosols last for short periods in the troposphere but its life time in the stratosphere is several years. The source of sulphate in stratosphere is volcanic eruption, e.g. the eruption of Elchino (1982) and Pinatubo (1991) produced a cooling effect for several years because of the presence of sulphate aerosol in stratosphere. Dimethylsulphid (DMS) is produced in large amounts by some marine phytoplankton, and could act in a feedback loop to stabilize temperature. High sea temperature could lead to more DMS being produced: this increases cloud cover, reflecting solar radiation and trapping heat radiated from the earth.

IV. Effects and Complications

Because of the combined effect of greenhouse gases, the changes that are happening now are certainly rapid enough. If no action is taken the green house effect could lead to rise in average global temperatures between 1.5°C to 4.5°C as early as the year 2030. The experts from the Inter Governmental Panel on Climate Change (IPCC) confirmed that the 1990s have been the hottest decade since records began 150 years earlier. According to them eleven of the twelve years in the period (1995-2006) rank among the top 12 warmest years in the instrumental record. They also found that the average temperatures had risen by roughly 0.74°C since 1900. And forecasts for the future are even more alarming as said earlier. These rises will be greater towards the poles and less at the tropics. There will also be more warming in winter than summer. Such increases will make the world hotter than it has been for more than 100,000 years. The rise will also be faster than ever before. Overall effects are more horrifying. Storms, cyclones, gales, hurricanes and typhoon will become more frequent and stronger as oceans heat up causing more water to evaporate. Evidence is building up at an alarming rate from Japan to USA. In September 1991, Japan was hit by typhoon Mireilly, its worst for 30years, then in September 1993 by typhoon Yancy, the worst for 50 years. In March 1993, 'the storm of the century' hit North America and in the recent past (1998 to 2009) there were many storms and hurricanes in that region particularly and the rest of the world in general. In the same way the continental heartlands will face draughts, Ethiopia, suffered one of the worst heat wave and draught in recent past. As far as floods are concerned, it is noteworthy that sea levels are rising at a rate of 1 to 2mm each year due to the melting of the polar ice and mountain glaciers. It is observed that the rise in sea level during 1993-2003 was at an average rate of 3.1mm/year. If it is not checked, the predicted rise by 2050 is between 20cm-50cm. This will be the major cause of flooding in the coastal areas, estuaries and low laying islands such as Bangladesh, Nile delta, Maldives.

Although the contribution made by fossils fuel (Oil, Gas and Coal) to our modern lives is incalculable. Even today, when alternative sources of energy have been developed, fossil fuels continue to meet almost all our power needs. Still fossil fuels are ahead of the competition. Unfortunately, as our economies continue to grow, we are using more fossil fuels than ever before. Almost four-fifths of the worlds energy comes from them. And forecasts suggest their dominance would not end any time soon, either.

On current trends, the world`s use of energy is set to almost double in the first 30 years of this century, with about 90% of the growth likely to be met by gas, oil and coal. Oil is more in demand than ever, and supplies are expected to jump by double. Both oil and coal will maintain their current shares of the total energy, while natural gas is actually expected to rise than ever before. Meanwhile, some alternative sources of energy are expected to go on the back burner that is the nuclear power (less than 7%), while hydro-electricity will hold the modest 2.2% shares. Sources such as solar energy and wind power have been growing with a good pace. No doubt, global standards of living have been improved many fold due to fossil fuels but these carry a critical flaw. The problem relates to how fossil fuels influence the greenhouse effect. Since the industrial revolution began, our use of fossils fuels have been releasing carbon dioxide and other greenhouse gasses into the atmosphere in large amount. Natural disasters such as volcanic eruption also spew heat trapping gasses but it is periodical and comparatively very low in amounts. Our use of fossil fuels is responsible for 85% of the carbon dioxide that has been added to our atmosphere. In the name of progress, we have dramatically enhanced the atmosphere heat trapping ability.

V. Conclusion

It is clear that things are starting to heat up for most of us, and that the number of draughts, storms, floods, heat waves, and other extreme events are on the rise, too. So it is important to slow the warming as much as possible. This means using less fossil fuels, eliminating CFCs altogether, and slowing down deforestation. This can be achieved best through energy conservation, including better use of public transport and through renewable energy such as solar, wave and wind energy. Instead of deforestation we have to start aforestation to soak up carbon dioxide. So we can make a difference by taking positive actions for controlling future greenhouse gas emissions and keep the problem under wraps. While the problem is global, the solution can be resolved regionally or locally. For this we must play our part positively and sincerely and become a part of the solution rather than the problem.

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18. **Pick a good study spot:** To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. **Think technically:** Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be

sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page

- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to

shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.
- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic

principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.

- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Administration Rules Listed Before Submitting Your Research Paper to Global Journals Inc. (US)

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

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	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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