Chapter – 7: Discussion

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DISCUSSION

7.1 Summary:

Traditional concept of awareness leads to the simple and linear connection to behaviour that the knowledge and understanding creates awareness which makes attitude and motivate people towards a particular behaviour. On the other hand women are the roots of a family, with different kinds of indoor and outdoor responsibilities they deals environmental, social and economic prospects, especially at Sunderbans itself is an environmentally degraded remote zone where people leaves with “less peaceful days and more stormy nights”. In these perspectives the researcher considered Environmental Awareness and participation in Sustainable Development as the major variables to observer in the field of Sunderbans on women. Through from the literature studies it has also been confirmed that knowledge gap was still remaining in this field of research. So, for understanding women Environmental Awareness, their participation in Sustainable Development at the islands of Sunderbans and to recommend some suggestions for promoting Environmental Awareness and participation in sustainability among women and effective strategies regarding these, the researcher designed her research project under the title “Environmental Awareness among women of Sunderban Islands and their participation in Sustainable Development”. The study carried out with the following objectives:

- To find out Environmental Awareness and participation of women in Sustainable Development;
- To find out the relation between educational qualification and Environmental Awareness of women for participation in Sustainable Development;
To find out the relation between educational qualification and participation in Sustainable Development of women;

To find out the relation between profession and Environmental Awareness of women;

To find out the relation between profession and participation in Sustainable Development of women;

To find out the relation between Environmental Awareness and participation in Sustainable Development of women;

To enlist the anthropogenic environmental hazards frequently occurring in the study region;

To suggest some guideline for promoting Environmental Awareness and participation in sustainability among women.

The study contains two main variables, as ‘Environmental Awareness’ and ‘Participation in Sustainable Development’. The other attribute variables were ‘Vulnerability’ (Low, Moderate, and High), ‘Profession’ (Self-help group, Non-self-help group) and ‘Qualification’ (Below primary, Class VI-X, Secondary, Higher Secondary and Under-graduate or post-graduate).

Though the researcher had considered her population as women of Sunderban Islands but delimited the target population of the study to only two blocks (consisting four islands, namely Sagar, Ghoramara, Mousuni and Namkhana islands of Sagar and Namkhana block) of the Sunderbans region. In the present study the researcher considered judgement sampling as sampling technique and the total sample size was 561. Sampling design and distribution were as follows.

Researcher selected 561 samples from different vulnerable zone, such as 160 from low vulnerable, 217 from moderate vulnerable and 184 from high vulnerable zone. Although the samples were classified into
different strata according the needs, as for profession 240 were from Self Help Groups (SHG) and 321 were of non-Self Help Groups (non-SHG); in an another way for educational qualifications 124 with below primary level of qualification, 155 with class VI-X level of qualification, 62 has secondary level of qualification, 136 with higher secondary level of qualification and 84 with UG or PG levels of educational qualification.

As the study followed Quasi Mixed Research Design it triangulated with both quantitative and qualitative tools. Closed type of questionnaire was used to asses Vulnerability, Environmental Awareness and participation in Sustainable Development. Besides that questionnaire, semi-structural interviews and focus group discussions also used to collect qualitative data. The scales for quantitative tools were followed different expertise guideline e.g. Vulnerability Assessment Scale (VAS) according to International Federation of Red Cross and Red Crescent Societies (IFRC, 2007) guidelines; Environmental Awareness Scale (EAS) developed by Dr. Haseen Taj and Environmental Behaviour Scale (EBS) developed by Archana Singhal, Pradeep K. Singhal and Urmila Verma. Moreover, the researcher had constructed her Environmental Awareness Scale and Environmental Behaviour Scale on the basis of the pilot study and initial qualitative observations.

In the present study different statistical techniques were applied to determine reliability and validity for constructed test and also to verify hypothesis. The reliability was carried out by Cronbach’s alpha and Test-Retest reliability; the hypotheses were verified by using Descriptive Statistics, viz., $M$, $Mdn$, $SD$, $V$, $Sk$, $Ku$, etc. and Inferential Statistics, viz., ‘$t$’-test and Pearson Product - Moment Correlation Coefficient.

### 7.2 Findings of the Study:

On the basis of the statistical analysis and the interpretations made in Chapter-6, the findings of the present study may go over here,
The study only found significant difference in the mean scores of Environmental Awareness between women with below primary (23.032) and higher secondary (24.404) level of academic qualification; otherwise it hadn’t found any significant difference in mean scores of Environmental Awareness among women of different vulnerable zone, profession or even belonging different educational qualifications. More specifically it could be stated in following way:-

1) No significant difference found in the mean scores of Environmental Awareness between women of Low (23.877) and Moderate (23.834) Vulnerable zone.

2) No significant difference found in the mean scores of Environmental Awareness between women of High (23.516) and Moderate (23.834) Vulnerable zone.

3) No significant difference found in the mean scores of Environmental Awareness between women of Low (23.877) and High (23.516) Vulnerable zone.

4) No significant difference found in the mean scores of Environmental Awareness between Self-help group (23.504) and Non-self-help group (23.925) women of total sample.

5) No significant difference found in the mean scores of Environmental Awareness between SHG women of Low (23.788) and Moderate (23.446) Vulnerable zone.

6) No significant difference found in the mean scores of Environmental Awareness between SHG women of Low (23.788) and High (23.306) Vulnerable zone.

7) No significant difference found in the mean scores of Environmental Awareness between SHG women of moderate (23.446) and High (23.306) Vulnerable zone.
8) No significant difference found in the mean scores of Environmental Awareness between SHG (23.788) and Non-SHG women (23.966) of Low Vulnerable zone.

9) No significant difference found in the mean scores of Environmental Awareness between SHG women of Low Vulnerable zone (23.788) and Non-SHG women of Moderate Vulnerable zone (24.130).

10) No significant difference found in the mean scores of Environmental Awareness between SHG women of Low Vulnerable zone (23.788) and Non-SHG women of High Vulnerable zone (23.660).

11) No significant difference found in the mean scores of Environmental Awareness between SHG women of Moderate Vulnerable zone (23.446) and Non-SHG women of Low Vulnerable zone (23.996).

12) No significant difference found in the mean scores of Environmental Awareness between SHG (23.446) and Non-SHG (24.130) women of Moderate Vulnerable zone.

13) No significant difference found in the mean scores of Environmental Awareness between SHG women of Moderate Vulnerable zone (23.446) and Non-SHG women of High Vulnerable zone (23.660).

14) No significant difference found in the mean scores of Environmental Awareness between SHG women of High Vulnerable zone (23.306) and Non-SHG women of Low Vulnerable zone (23.966).

15) No significant difference found in the mean scores of Environmental Awareness between SHG women of High
Vulnerable zone (23.306) and Non-SHG women of Moderate Vulnerable zone (24.130).

16) No significant difference found in the mean scores of Environmental Awareness between SHG (23.306) and Non-SHG (23.660) women of High Vulnerable zone.

17) No significant difference found in the mean scores of Environmental Awareness between Non-SHG women of Low (23.966) and Moderate (24.130) Vulnerable zone.

18) No significant difference found in the mean scores of Environmental Awareness between Non-SHG women of Low (23.966) and High (23.660) Vulnerable zone.

19) No significant difference found in the mean scores of Environmental Awareness between Non-SHG women of High (23.660) and Moderate (24.130) Vulnerable zone.

20) No significant difference found in the mean scores of Environmental Awareness between women with below primary (23.032) and class VI – X (23.806) level of academic qualification.

21) No significant difference found in the mean scores of Environmental Awareness between women with below primary (23.032) and secondary (24.129) level of academic qualification.

22) **Significant** difference found in the mean scores of Environmental Awareness between women with below primary (23.032) and higher secondary (24.404) level of academic qualification.
23) No significant difference found in the mean scores of Environmental Awareness between women with below primary (23.032) and UG/PG (23.333) level of academic qualification.

24) No significant difference found in the mean scores of Environmental Awareness between women with class VI – X (23.806) and secondary (24.129) level of academic qualification.

25) No significant difference found in the mean scores of Environmental Awareness between women with class VI – X (23.806) and higher secondary (24.404) level of academic qualification.

26) No significant difference found in the mean scores of Environmental Awareness between women with class VI – X (23.806) and UG/PG (23.333) level of academic qualification.

27) No significant difference found in the mean scores of Environmental Awareness between women with secondary (24.129) and higher secondary (24.404) level of academic qualification.

28) No significant difference found in the mean scores of Environmental Awareness between women with secondary (24.129) and UG/PG (23.333) level of academic qualification.

29) No significant difference found in the mean scores of Environmental Awareness between women with higher secondary (24.404) and UG/PG (23.333) level of academic qualification.

In case of women participation in Sustainable Development it has been found that women were significantly differing in the mean scores of Participation in Sustainable Development at high & moderate, and low
& high vulnerable zone; but no significant difference has been found among women with different academic qualifications. Besides that women were significantly differing along with profession and vulnerable zones. As it has been found that the mean scores of Participation in Sustainable Development of SHG women of High Vulnerable (19.880) Zone were significantly higher than both SHG (17.760) & Non-SHG (18.213) women of Low vulnerable zone. Moreover the Non-SHG women of High Vulnerable zone (19.614) also has Significantly higher mean scores of Participation in Sustainable Development than both the SHG (17.760) & Non-SHG (18.213) women of Low Vulnerable zone. These could be represented as follows:

30) No significant difference found in the mean scores of Participation in Sustainable Development between women of low (18.012) and moderate (18.751) vulnerable zone.

31) Significant difference found in the mean scores of Participation in Sustainable Development between women of high (19.777) and moderate (18.751) vulnerable zone.

32) Significant difference found in the mean scores of Participation in Sustainable Development between women of low (18.012) and high (19.722) vulnerable zone.

33) No significant difference in the mean scores of Participation in Sustainable Development between women who belongs to self-help groups (18.950) and those do not belongs to Self-help groups (18.791).

34) No significant difference found in the mean scores of Participation in Sustainable Development between women with below primary(18.709) and class VI – X (19.206) level of academic qualification.
35) No significant difference found in the mean scores of Participation in Sustainable Development between women with below primary (18.709) and secondary (19.145) level of academic qualification.

36) No significant difference found in the mean scores of Participation in Sustainable Development between women with below primary (18.709) and higher secondary (18.955) level of academic qualification.

37) No significant difference found in the mean scores of Participation in Sustainable Development between women with below primary (18.709) and UG/PG (18.071) level of academic qualification.

38) No significant difference found in the mean scores of Participation in Sustainable Development between women with class VI – X (19.206) and secondary (19.145) level of academic qualification.

39) No significant difference found in the mean scores of Participation in Sustainable Development between women with class VI – X (19.206) and higher secondary (18.955) level of academic qualification.

40) No significant difference found in the mean scores of Participation in Sustainable Development between women with class VI – X (19.206) and UG/PG (18.071) level of academic qualification.

41) No significant difference found in the mean scores of Participation in Sustainable Development between women with secondary (19.145) and higher secondary (18.955) level of academic qualification.
42) No significant difference found in the mean scores of Participation in Sustainable Development between women with secondary (19.145) and UG/PG (18.071) level of academic qualification.

43) No significant difference found in the mean scores of Participation in Sustainable Development between women with higher secondary (18.955) and UG/PG (18.071) level of academic qualification.

44) No significant difference found in the mean scores of Participation in Sustainable Development between SHG women of Low (17.760) and Moderate (19.106) Vulnerable zone.

45) **Significant** difference found in the mean scores of Participation in Sustainable Development between SHG women of Low (17.760) and High Vulnerability (19.880) Zone.

46) No significant difference found in the mean scores of Participation in Sustainable Development between SHG women Moderate (19.106) and high (19.880) Vulnerable zone.

47) No significant difference found in the mean scores of Participation in Sustainable Development between SHG (17.760) and Non-SHG (18.213) women of Low Vulnerable zone.

48) No significant difference found in the mean scores of Participation in Sustainable Development between SHG women of Low Vulnerable zone (17.760) and Non-SHG women of Moderate Vulnerable zone (18.479).
49) **Significant** difference is found in the mean scores of Participation in Sustainable Development between SHG women of Low Vulnerable zone (17.760) and Non-SHG women of High Vulnerable zone (19.614).

50) No significant difference found in the mean scores of Participation in Sustainable Development between SHG women of Moderate Vulnerable zone (19.106) and Non-SHG women of Low Vulnerable zone (18.213).

51) No significant difference found in the mean scores of Participation in Sustainable Development between SHG (19.106) and Non-SHG (18.471) women of Moderate Vulnerable zone.

52) No significant difference found in the mean scores of Participation in Sustainable Development between SHG women of Moderate Vulnerable zone (19.106) and Non-SHG women of High Vulnerable zone (19.614).

53) **Significant** difference found in the mean scores of Participation in Sustainable Development between SHG women of High Vulnerable zone (19.880) and Non-SHG women of Low Vulnerable zone (18.213).

54) No significant difference found in the mean scores of Participation in Sustainable Development between SHG women of High Vulnerable zone (19.880) and Non-SHG women of Moderate Vulnerable zone (18.479).

55) No significant difference found in the mean scores of Participation in Sustainable Development between SHG (19.880) and Non-SHG women of High Vulnerable zone (19.614).
Discussion

56) No significant difference found in the mean scores of Participation in Sustainable Development between Non-SHG women of Low (18.213) and Moderate (18.479) Vulnerable zone.

57) **Significant** difference found in the mean scores of Participation in Sustainable Development between Non-SHG women of Low (18.213) and High (19.614) Vulnerable zone.

58) No significant difference found in the mean scores of Participation in Sustainable Development between Non-SHG women of Low (19.614) and Moderate (18.479) Vulnerable zone.

The study revealed that the relationship between Environmental Awareness and participation in Sustainable Development among women were significant in respect to vulnerabilities, professions and educational qualifications, except among the women with below primary qualification (r = -0.037) and also to women residing at high vulnerable zone (0.072). These were as follows:

59) **Significant** relationship found between Environmental Awareness and participation in Sustainable Development of the total sample (r = 0.344).

60) **Significant** relationship found between Environmental Awareness and participation in Sustainable Development among the women resides at Low vulnerable zone (r = 0.560).

61) **Significant** relationship found between Environmental Awareness and participation in Sustainable Development among the women resides at Moderate vulnerable zone (r = 0.320).

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62) No significant relationship found between Environmental Awareness and participation in Sustainable Development among the women resides at Low vulnerable zone ($r = 0.072$).

63) **Significant** relationship found between Environmental Awareness and participation in Sustainable Development among the women involved Self-Help groups ($r = 0.284$).

64) **Significant** relationship found between Environmental Awareness and participation in Sustainable Development among the Non-SHG women ($r = 0.391$).

65) No significant relationship found between Environmental Awareness and participation in Sustainable Development among the women with below primary qualification ($r = 0.037$).

66) **Significant** relationship found between Environmental Awareness and participation in Sustainable Development among the women with secondary level of qualification ($r = 0.510$).

67) **Significant** relationship found between Environmental Awareness and participation in Sustainable Development among the women with secondary level of qualification (0.375).

68) **Significant** relationship found between Environmental Awareness and participation in Sustainable Development among the women with higher secondary level of qualification ($r = 0.350$).

69) **Significant** relationship found between Environmental Awareness and participation in Sustainable Development among the women with under-graduate or post-graduate degree qualification ($r = 0.543$).
7.3 Discussion:

After analysing the quantitative and qualitative data the researcher made the interpretations and presenting the discussion according to objectives in the following way:

- **Objective: 1 - Environmental Awareness and Participation in Sustainable Development Among Women of Sunderban Islands:**

  The present study first attempted to find out Environmental Awareness and participation in Sustainable Development among women of Sunderban islands. For this the researcher made some hypotheses (based on initial assumptions) stated as $H_0.1$ to $H_0.3$ and $H_0.15$ to $H_0.17$.

  In this particular aim the descriptive results showing that the mean score of Environmental Awareness is decreasing according to the vulnerability i.e. the women from low vulnerable zone are with higher mean of Environmental Awareness than women of moderate and high vulnerable zones. Similarly women from moderately vulnerable zone are seeking higher score in Environmental Awareness than women of high vulnerable zone. But the participation in sustainability is increasing with vulnerability i.e. women of high vulnerable region have the highest score in participation towards sustainability, on the other hand women from low vulnerable zone have the lowest mean in participation towards sustainability.

  The findings do not reflect any significant difference for Environmental Awareness in different vulnerable zone. Though, in case of participation in sustainability there no significant difference was found between women of low and moderate vulnerable zone, but it gained significant differences between women of high and moderate vulnerable zone and also between women of low and high vulnerable zone.
It supports the gap existing between knowledge based awareness and behaviour toward environment. The oldest and simplest models of pro-environmental behaviour were based on a linear progression of environmental knowledge leading to Environmental Awareness and concern (environmental attitudes), which in turn was thought to lead to pro-environmental behaviour (Burgess et al.; 1998. p. 1447). But these models from the early 1970s were soon proven to be wrong. Research showed that in most cases, increases in knowledge and awareness did not lead to pro-environmental behaviour. Many researchers have tried to explain this gap. Ajzen and Fishbein addressed these issues of discrepancies in their Theory of Reasoned Action and Theory of Planned Behaviour (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). They mentioned that people are essentially rational, in that they ‘make systematic use of information available to them’ and are not ‘controlled by unconscious motives or overpowering desires’, neither is their behaviour ‘capricious or thoughtless’ (Ajzen & Fishbein, 1980, introduction; Fishbein & Ajzen, 1975, p. 15). Thus ‘the ultimate determinants of any behaviour are the behavioural beliefs concerning its consequences and normative beliefs concerning the prescriptions of others’ (Ajzen & Fishbein, 1980, p. 239). As attitudes can only influence behavioural intentions which turn in shape one’s action, so intentions are also influenced by social (‘normative’) pressures.

Here, in this study it also revealed that in the high vulnerable zone where women were more respondent to sustainability, have comparatively less Environmental Awareness; again in low vulnerability region where women have comparatively high Environmental Awareness were less respondent to sustainable Behaviour.

In other words, it could be assumed that the women of high vulnerable zone were more likely to be respondent to sustainability as because they were more directly suffered due to environmental problems like sea-level rise than others, what may not be able to aware them in
conventional knowledge of Environmental Awareness but to behave in more sustainable manner. So, to explain Environmental Awareness and participation in sustainable behaviour in an in-depth way it needs to verify the next aims of the present study.

- Objective: 2 - Relation between Educational Qualification and Environmental Awareness of Women residing at Sunderban islands:

The second objective of the study was to find out the relation between educational qualification and Environmental Awareness of women. The Environmental Awareness has been defined as the progression of “the understanding and competence to recognizing environmental resources and interdependence between physical and biological components of the environment for the growth and development” (Suresh & Lalmanis, 2010). In short, environmental knowledge based on understanding could generate the Environmental Awareness and one of the most important sources for gaining knowledge is formal educational system. So, the study considered to find out the relation between formal educational qualification and Environmental Awareness as stated in $H_{0.5}$ to $H_{0.14}$. Here it tried to observe the Environmental Awareness among women with different educational qualification (below primary to under graduate or post graduate level). Here, the study tried to judge the total sample irrespective of vulnerability and profession but in respect of formal educational qualification.

The result contains some discrepancy. As the mean scores of Environmental Awareness were initially increasing with formal academic qualification, as women with below primary, class VI-X, secondary and Higher Secondary qualification were respectively belonging higher mean. Exception happened in case of under- graduate and Post Graduate level. Women with UG/PG degree have higher mean than below primary
qualified women, though they have lower mean score than women of VI-X, Secondary and Higher Secondary qualification. Moreover, the inferential statistics shows that there is a **significant** mean difference in Environmental Awareness between women with below primary and higher secondary level of qualification. But in other combinations of educational qualification no significant difference has found.

If educational qualifications being enable to create any difference in Environmental Awareness then the Environmental Awareness would gradually increase in relation to educational qualifications. The result differs with the study carried out by R. Nagalakshmi, of DIET (Salem, Tamil Nadu) named “Environmental Awareness among women in Salem” which finds that ‘women with different educational qualification differed in their level of Environmental Awareness.’ To justify the result some qualitative data also acquired, with interviewing some professionals involved in existing educational institutions and research organizations. It explored that, environmental study now a day’s has getting importance in formal education system though it became a less-prioritized subject for both teacher and pupil. Besides that, the samples of the present study were middle aged women, and most of them had completed their formal education before environmental education included into the curriculum frame work of the state.

From the output of this objective it assumed that there are some lacunas in the existing education system (formal) to develope Environmental Awareness, for which no significant influence of educational qualification has been traced in disseminating Environmental Awareness.
Discussion

- **Objective: 3 - Relation between educational qualification and participation in Sustainable Development of women:**

  The third objective of this study was to verify how far existing educational system is effective to promote participation towards Sustainable Development as stated in $H_0.19$ to $H_0.28$. The decade of Education for Sustainable Development is going on and it has been unanimously accepted that Education is the ‘tool’ to achieve Sustainable Development. But, what kind of Education would be suitable for these? Whether the existing one quit sufficient?

  The results do not support these. Like Environmental Awareness it also found some discrete result. No continuation of decrease or increase scores found according to qualification regarding participation in sustainability. Even no significant differences were found between groups of different educational qualification strata for their participation in Sustainable Development.

  So, it concludes that the existing formal educational system neither effective to promote significant Environmental Awareness nor participation in sustainable developmental activities. Dr. Amalosh Mishra, An expert working with environment – human dealings says, presently ‘education’ works for ‘employment’ not to motivate pupil to shape up behaviours.

- **Objective: 4 - The relation between profession and Environmental Awareness of women residing at Sundarban islands:**

  The forth objective of the study was to observe the impact of profession on Environmental Awareness rather the relation between profession and Environmental Awareness. According to the design of the study two categories of profession i.e. self-help group and non-self-help
group were considered. With \( H_0.4 \) and \( H_0.29 \) to \( H_0.43 \) it tried to verify this objective.

The late Prime Minister Mrs. Indira Gandhi was the only Head of Government, attending the 1972 Stockholm conference, which was called the ‘U.N. Conference on Human Environment’. She first pointed out that poverty was the greatest polluter and unless it was eliminated through national and international efforts it was futile to talk about protecting the planet from environmental disaster. The concept of micro finance and self-help group was a great effort to eradicate poverty. With considering all these efforts it has been assumed that the economic independence helps women to be empowered and they could raise their voice by holding a decision making parts as well as they also would be conscious regarding their surroundings; effectively toward environment. In short, the assumption was economic empowerment could disseminate awareness and encourage women participation in environmental issues. Now, the result of the present investigation does not showing its reflection here. No significant difference have found in the mean scores of Environmental Awareness between Self-help group and Non-self-group women of total sample. Even no significant difference also found in Environmental Awareness between groups with different combinations of two variables viz. vulnerability and profession.

- **Objective: 5 - The relation between profession and participation in Sustainable Development of women:**

  Similar as objective-4, here the study tried to observe, if there is any relation between profession and participation in sustainable developmental activities, as stated in \( H_0.18 \) and \( H_0.44 \) to \( H_0.58 \).

  Though in case of participation in Sustainable Development no significant difference have found in the mean scores of participation in Sustainable Development between SHG and Non-SHG women of total
sample, but SHG women were possess higher mean score than Non-SHG women.

Moreover, there were significant mean differences found in four facts regarding participation in sustainability, that comprising different combinations of two variables – vulnerability and profession. These are as follows:

i. There was significant mean difference in participation towards sustainability between women of self-help groups from low and high vulnerability region.

Here it finds that SHG women of high vulnerable zone were more significantly behave in sustainable manner than SHG women of low vulnerable zone.

ii. There was significant mean difference in participation towards sustainability between women of self-help group at low vulnerable zone and non-self-help group at high vulnerable zone.

Here it finds that Non-SHG women of high vulnerable zone were also behave more significantly in a sustainable manner than SHG women of low vulnerable zone.

iii. There was significant mean difference in participation towards sustainability between women of non-self-help group at low vulnerable zone and self-help groups at high vulnerable zone.

Here it finds SHG women of high vulnerable zone were more significantly behave in sustainable manner than Non-SHG women of low vulnerable zone.
iv. There was significant mean difference in participation towards sustainability between women of non-self-help groups both at low and high vulnerable zone.

Here it finds Non-SHG women of high vulnerable zone were more significantly behave in sustainable manner than SHG women of low vulnerable zone.

Hence, it seems to nullify the factor of profession here. But a qualitative observation makes some difference. That is, the job pattern in SHG women of high vulnerable zone differs from women of low vulnerable zone. As SHG women of high vulnerable zone were more involved in green jobs like mangrove plantation, conservation, the preparation and protection of mangrove villages etc. which may responsible for their environmental orientation in such a functional way. This findings also could assume that a functional literacy approach might be required for Environmental Awareness rather literacy. It may support Eric Eckl’s argument – ‘Which comes first, Environmental Awareness or environmental action?’ and ‘often small actions lead to big attitude changes, and then on to the big behaviour changes’ (The free library, 2010).

As these findings made new assumption relating to job pattern of SHG’s so a triangulation includes in the study to make a qualitative insight. Unstructured interviews taken from experts, workers and others lived or involved in any way at the high vulnerable zone. Bahirplot is one of the most vulnerable areas at Sagar Island of Sunderban delta. Some local NGO like Sagar Mangal taken initiatives to aware the local people because the solution was to create and maintained mangrove forest but destruction of local mangrove forest was responsible for this manmade hazard. Now the NGO named NEWS (Nature Environment and Wildlife Society) working with women and create so many self - help groups to create and protect mangrove forest at river side. This case of women
empowerment programme running by NEWS was useful to enhance women participation in sustainability due to their initiatives to prepare S.H.Gs working green jobs with environmental issues, but this study doesn’t comment on every activities acting ahead to women empowerment, so in this area more research works need to be initiated.

- Objective: 6 - The relation between Environmental Awareness and participation in Sustainable Development of women:

To determine the 6th objective it framed H₀.59 to H₀.69, in every cases it found significant relationship between Environmental Awareness and participation in Sustainable Development except two cases.

1) No significant relationship found between Environmental Awareness and participation in Sustainable Development among women resides at high vulnerable zone.

2) No significant relationship found between Environmental Awareness and participation in Sustainable Development among women with below primary education.

As it finds significant relationships in maximum cases then it could inferred that Environmental Awareness and participation in Sustainable Development influences each other. It also to remind that instead of traditional bookish knowledge based awareness, information related to practical life-experience through participation mere functionally effective to retain awareness and act in more sustainable way.

- Objective: 7 - What are the anthropogenic environmental hazards frequently occurring in the study region:

A survey by a UNEP team in collaboration with Nature Seychelles monitored the re-colonization of coral reefs following the bleaching event in 1998, and the later smaller ones in 2001-2003. The results revealed a
remarkable relationship between coastal infrastructure development (roads, settlements and buildings) and loss of coastal vegetation diversity, and also great differences in the recovery rate of bleached corals.

The region is guarded by the Bay of Bengal; although Sunderban is an excellent example of the coexistence of human and terrestrial plant and animal life (Appendix-H, Pic. 7.1). But it is also a fact that here human interference not only encouraging environmental degradation and hazards only, also creating psychological and health hazards too.

i) Mangrove exploitation:

The Mangrove ecosystem plays an essential role in limiting silt and nutrient outflows to the near shore marine environment, including run-off of sewage animal waste and top soil during the heavy tropical rains or from rivers. It can serve as buffers to protect the shore line from wind generated storms while at the same time they absorb silt, nutrients, toxic substances and support fisheries, provide construction materials, medicines and a huge range of other goods used by communities. The clearing of coastal forests increases suspended sediments and nutrients in terrestrial run-off, causing direct and indirect effects on algal and coral growth and competition and coral reef resilience and recovery (McCook 1999, Nyström et al. 2000). Even unsustainable watershed management practices far inland may impact coral reefs through increased discharges of silt into the ocean (UNEP, 2004). Areas with extensive natural vegetation and mangroves may have reduced human and property losses following the tsunami event on December 26th, 2004 (UNEP, 2005). But the Sundarban mangrove forests are also becoming more vulnerable due to the significant rise of shrimp farming in the region. The increase of shrimp farming has negatively affected agriculture and also contributed to the loss of mangrove forests during the past two decades.
**ii) Excessive fishing:**

While the immense importance of marine fisheries is acknowledged worldwide, coastal fisheries provide an essential role for the livelihoods and cultures of a large share of the World’s population. One third of the world’s population lives in the coastal zone, which comprises an area of only 4% of the total land surface (UNEP, 2006). However, the vital role of land-based activity for coastal ecosystems has not been given adequate attention. And indiscriminate collection of prawn seedling, excessive fishing round the year in Sunderbans water, poses a serious threat on the natural environmental balance (Appendix-H, Pic. 7.3 and 7.4).

**iii) Overpopulation:**

The carrying capacity of the Indian Sunderbans has been exceeded, and the increased population is exerting pressure on the fragile and richest ecosystem of the world, a World Bank report said this. “The population is growing and exerting even greater pressure on fragile and recovering natural systems. As a result of high birth rates and migration inflows, population density is high and growing”, said the report ‘Building resilience for the Sustainable Development of the Sunderbans.’

**Table: 7.1: Population Increase at Sunderbans:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>11,59,559</td>
</tr>
<tr>
<td>2001</td>
<td>37,55,924</td>
</tr>
<tr>
<td>2011</td>
<td>44,26,259</td>
</tr>
<tr>
<td>2014</td>
<td>47,00,000 (approx)</td>
</tr>
</tbody>
</table>
The Sunderbans has a high population density of about 1000 persons a
sq. Km, equivalent to the 1030 of entire West Bengal. Almost the entire
population depend on the natural resource based livelihood patterns.

iv) Climate change:

The study on ‘Climate change impacts on Indian Sunderbans: a
time series analysis (1924–2008)’ by A. Rahaet. al reveals the
cumulative effect of climate change and anthropogenic disturbance on the
diversity and productivity in World’s largest ecosystem; and advocates
mangrove plantation and effective management of freshwater resources
for conservation of the most vulnerable and sensitive ecosystem.

v) Flood:

G.R. Brakenridge and his colleagues from Dartmouth Flood
Observatory, Hanover, and USA have compiled digital records of major
deluges in various parts of the globe. As per that between 1985 and 2007
West Bengal has faced 23 major floods. Irony is that the rivers
submerging vast tracts of habitation and agriculture lands have origins
outside the state (Appendix-H, Pic.7.5 and 7.6).

A strategic plan for flood hazard in urban areas therefore must
include construction, restoration or improvement of drainage and removal
of all human encroachment along the river banks.

vi) Erosion:

Climate change induced sea level rise (SLR) added with
anthropogenically altered environment leads to rapid land dynamics in
terms of erosion and accretion; and alteration in species diversity and
productivity, more pronouncedly in sensitive ecosystems such as river
deltas (Appendix-H, Pic.7.7 and 7.8).
**vii) Mental health hazard:**

Another practical scenario is that a number of environmental threats including that of climate change and man-animal conflict are driving villagers in Sunderbans islands towards madness and even suicide. Findings from mental health clinics reveal that around 11.2 per cent of the cases had history of attempt to suicide, of which 55 per cent used pesticides to kill themselves. The insecurity causing loss of land, sea levels in the Sunderbans area have been rising at an alarming rate of 3.14 mm per year due to global warming. Two islands have already disappeared under water while almost all the 54 inhabited islands are reported to be shrinking due to erosion.

Prof. Barun Kanjilal of The Indian Institute of Health Management Research (IIHMR) says under the given circumstances mental health problems threaten to be one of the most critical public health issues in the Sunderbans. "People here are living under continuous stress due to various environmental challenges and frequent climatic shocks like storms or cyclones. It is because of a complex set of psycho-social stress creators which are closely linked to the gripping livelihood challenges in the region and may trigger a pandemic of mental health problems," he warns. Chittapriyo Sadhu, project manager of international NGO Save the Children, says ‘women are the most vulnerable as they have to handle household chores, children and even work in the fields’. Putting stress on the mental health of the villagers, the ill-effects of abject poverty and deprivation in the remote islands of the UNESCO World Heritage site are compounded by acute struggle against ecological hazards, experts say. A study conducted on the clinical records of patients admitted for attempted suicide to six government hospitals in the Sunderbans found that women accounted for 65 per cent of such cases.
An absence of mental health clinics in the region is aggravating the problem as people opt for 'ojhas' to ward off evil spirits whenever anyone reports falling mental health.

viii) Cyclone:

The next worst natural hazard that hits West Bengal almost every year is the cyclone. One of the worst cyclone hit Sagar Island killing 50,000 people and 1,00,000 cattle’s in March 1833. Again in October 1854 a 12 m high surge hit the coasts and water levels rose in Kolkata and neighbourhood. Nearly 50,000 people perished in this cyclone. Main anthropogenic reason for this could be more and more people settling close to the sea!

ix) Tsunami:

Tsunami is another natural hazard for which the coastal areas of West Bengal have to remain geared up. Only plus point it that the Ganga-Meghna mega fan - that is the fan shaped gently sloping feature formed by the sediments deposited by these two rivers in the sea and the Sunderbans act as a buffer for the Tsunami. But scientists from Zoological Society of London (ZSL) state that the Sunderbans ecosystem is rapidly changing, as human development thrives, and global temperature continues to rise, as much as 200m of mangrove coastline is disappearing annually.

x) Industrialisation:

Rapid industrialisation and urbanisation in Kolkata, Howrah and the newly emerging Haldia complex have caused considerable ecological imbalance in the adjacent coastal zone. The research, conducted by a group of scientists from Calcutta University and Techno India University, says there has been a steady increase in the percentage of toxic heavy metals leading to the gradual deterioration of water there. "The low salinity and intense industrialisation in the Hooghly estuarine stretch is
responsible for the high concentration of heavy metals in the shrimp muscle sampled from stations in and around the western side of Sundarbans," according to lead researcher and marine scientist, Dr. Abhijit Mitra.

**xi) Pollution and health hazards:**

Industries located along the Gangetic delta in Haldia, Kolkata and its outskirts are polluting the fragile ecosystem of Sundarbans, home to 40 lakhs (4 millions) people and the Royal Bengal Tiger, a latest study says. The scientists studied presence of zinc, copper and lead in the body of a shellfish species, commonly known as the Indian white shrimp, to assess the damage being done to the aqua-system.

Though heavy metals such as copper, zinc and lead are normal constituents of marine and estuarine environments, additional quantities when introduced through industrial wastes or sewage enter the biogeochemical cycle and pose negative impact on the biotic community.

The highest concentration of heavy metals in prawn muscle was found at Nayachar Island, near the Haldia industrial belt. The lowest concentration was observed at Satjelia Island, far away from the industrial and anthropogenic stresses, in the Matla estuarine stretch and almost adjacent to the protected reserve mangrove forest.

"Due to the toxic nature of certain heavy metals, these chemical constituents interfere with the ecology of the environment and on entering into the food chain they cause potential health hazards, mainly to human beings," says co-researcher Subhra Bikash Bhattacharyya from Techno India.

Rising sea levels in the Sundarbans have seen excess salinity in the soil and river water, leading to the slow death of the magnificent mangroves that protected these 102 islands and the hinterland from the cyclones that sweep across the Bay of Bengal. The mangroves of the
Sunderbans are dying. This is bad news for Kolkata and the rest of Gangetic West Bengal, still reeling from the onslaught of Cyclone Aila. For the people here, it will mean less peaceful days and more stormy nights. So an appropriate policy of sustainable intervention guided by a thorough research is required. And it also requires more in depth side specific research for searching the proper implementations and plan of actions with continuous follow up. Finally, whatever it concludes, the most essential is a joint venture of local, regional, national and international well beings along with common people.

- **Objective: 8 - Guideline for promoting Environmental Awareness and participation in sustainability among women:**

  It has already found that different adjustment techniques like acceptance, technological control, relocation, regulation and emergency measures even alternative livelihood included by local govt. and people to cope with environmental hazards. There also existing different kinds of adoptive measures as follows:

  **a) Technical control:**

  Local ridges made with mud and bamboo are severally used at this region but concrete barrages made with brick and other materials are also gaining concentration, though in several places at Sagar they are no longer been able to fight against the hungry tides, whether at Mousuni and Ghoramara constructing a new embankment seems like an annual ritual (Appendix-H, Pic.7.9 and 7.10).

  Concrete flood centres are also established for emergency measure. There are two flood centre constructed at two schools namely- Laxman Parabesh High School and Bamankhali M.P.P. High School. Govt. initiative to alert coastal people with rapid announcements for pre and post calamity preparation even in this year 2015 it found pre protective measures taken at Sagar with flood relief and rehabilitation including arrangements of food, shed and relief centre.
Discussion

b) Relocation and migration:

In every high tide (Bhara Kotal) there are so many places like Sumatinagar, Kachuberia, Dhablat, Dhaspara goes flooded and a lot of people comes to flood camps for shelter and temporarily relocated that also creating a situation for migration to mainland (Appendix-H, Pic.7.11, 7.12 and 7.13).

c) Acceptance:

As the river shifting ahead with erosion the local people who facing regular land loss are also going backward with shelter and became used to by facing a regular hazards, an acceptance taking place in their behaviour. Their dependency on relief system creates new question (Appendix-H, Pic.7.14, 7.15 and 7.16).

d) Eco-tourism:

World heritage site Sunderbans is also rebound for tourism. The Govt. of West Bengal has declared few projects for eco-tourism which could be helpful for its Sustainable Development. Especially ‘Ganga Sagar Mela’ in every year at January attracts above 7 lakhs of tourists at the holy place of Kapil Muni that definitely makes a lot of mash for eco-health. Introduction of eco-tourism might be activated as a poultice to this eco-ulcer (Appendix-H, Pic.7.17).

e) Change in livelihood:

The Government of West Bengal had set up the Sundarban Development Board in 1973 under the administrative control of Development & Planning Department for a comprehensive development of the region. With further emphasis on the development of this region, a new Department of Sundarban Affairs was created in 1994 and Sundarban Development Board was placed under its administrative control. Although these departments primarily emphasises to the construction of infrastructures, roads, bridges, culverts for better
communication of this remotest land to main land; but it also attempting social forestry division, agriculture extension programme, promoting unconventional sources of energy at streets, jetty, schools, market places, awareness camps through environmental campaigning, Bonbibi festival, celebration of Sunderbans Day etc. to endorse alternative livelihood for planned and scientific environ-economic progress.

On the other hand, field visit to Bahirplot, Radha krishnapur making difference from others. It is situated just beside the river bank and faced several hazards. Local women said they got the solution by involving themselves at women Self Help Group for mangrove plantation and protection. People of Bahirplot faced erosion and other environmental hazards that made them ruined. The local dam submerged for three times, lastly local govt. and West Bengal Forest Department jointly worked to solve the problem. Local schools were also involved themselves to prepare 'Mata- Committee’ (the mother teacher associations) that spread awareness among local women to develop environment friendly behaviour in day to day house hold activities, some local NGO like Sagar Mangal also taken initiatives to aware the local people because all realized that the solution was to create and maintained mangrove forest. They also constructed some rules and regulations to control destructive human behaviours like-

✓ Cutting trees were strictly prohibited
✓ No birds would be disturbed.
✓ Work side for mangrove forestation would be protected by local people.
✓ Cows and goats would not be allowed to the mangrove forestation area etc.

Local people were motivated to protect the mangrove forests newly created because they understood that it was the only way to save life and properties. And remarkable thing was that the last forth dam was
sustaining and they are not yet effected through environmental hazards even last ‘Aila’ became failed to hart them.

So from this case of Bahirplot a new approach comes out, that is a joint venture of formal educational institutes and informal educational institutions like local govt., clubs, families and NGOs may be significantly successful to fight over the global issue. And it supports Artur Victoria’s view that ‘Establish an Environmental Awareness not walk in the narrow sense, but to understand, investigate, search, so intense, in the fields of formal and informal education, the best conditions for its practice of teaching’ (Environmental Education and Awareness Training; the free library; 2009). Agenda 21 of United Nations Environment Programme: Environment for development – also made an Objective (24.2) (e) ‘to assess, review and implement, where appropriate, curricula and other material, with a view to promoting the dissemination to both men and women of gender-relevant knowledge and valuation of women roles through formal and non-formal education, as well as through training institutions, in collaboration with non-governmental organizations.’

These initiatives could be figure with a dynamic diagram, and that might not only disseminate sustainable practices but also develop a healthy and inter-dependable bondage among local agencies of education (both formal and informal).
It will work as a dynamic process like following fig. 7.2:

**Fig. 7.2: Inter-dependable bondage among local agencies of Education**

**7.3.1 Implementation of the model:**

- To implement this model it needs to impart Sustainable Development in the concept of all round development as a broader concept of education which would be able to interconnected the different agencies both formal and informal education in an inter-dependable manners.

- The formal agencies of education like local school, college or any other educational institutes would disseminate awareness and develop sustainability to students with formal teaching-learning
process, to women community by forming self-help groups and also to mothers’ with organizing ‘mother-teacher associations’.

- The informal educational agencies like family, club, NGO, local govt., mass media also would provide awareness and develop sustainability to the families and community.

- It needs to develop a liaison of interdependency between formal and informal agencies of education.

- Families and community should be enriched from both ways of formal and informal agencies to disseminate sustainable practices.

- A holistic approach needs to inter-lined all the sources of education and environmental sounds from different corners may procreate sustainable lifestyle among community.

- Formal education also needs to treat environmental issues in an inter-disciplinary way with introducing integrated approach. Besides institutional environmental activities it also could involve environmental objectives to each topic of every subject, in short, every session of teaching-learning could spread an environmental message to the pupil with connecting the topic of the class.

- To implement the model it is urgently required to develop interactive teaching-learning materials and integrated curriculum with environmental values and objectives.

7.4 Implication of the Study:

The study has its implications in the scope of the follow-up actions of its outputs. The main objective of this study was to find out the impact of vulnerability, profession and qualification on women environmental knowledge and participation in sustainability. The findings of the present
study have revealed a lot of gaps in Environmental Awareness and participations in Sustainable Development. The identified gaps were creating new research problems, results of the present study raised a doubt about the existing education system and its usability to disseminate environmental awareness and promote behaviours toward sustainable development. Prescribed model in the findings of the study can be implemented to disseminate Environmental Awareness and enhance women participation in Sustainable Development. It also raised the agenda of integrated curriculum and interactive teaching-learning materials for effective formal education towards environmental issues.

7.5 Conclusion:

In conclusion, it have to accept that there are **actually two Sundarbans** – the periphery Sundarbans, which is closer to urban centers, more accessible, and more developed, while the other – the remote Sundarbans – is closer to forest and sea, hard to access, and less developed. Definitely places within Sunderbans vary with their situations, problems and needs. Moreover, the issues of women Environmental Awareness and participation in Sustainable Development, especially at Sunderban islands, are very much field specific issue. The study recommends for special attention of Government and policy makers to design programmes for disseminating Environmental Awareness among women to enhance their Participation in Sustainable Development. The study had observed that different administrative departments of Sunderbans development concentrating on infrastructural development that may not be sound enough to environment and there is a clear gap for women-centric environmental activities. The Sunderban Day had been celebrated on 21st August, 2012 and 11th December both in 2014 & 2015; seminars - campaigning on these days obviously significant to spread up Environmental Awareness but that doesn’t ensures to reach to a great percentage of women folk. The West Bengal Govt. declared to ban plastic carry-bag in Ganga Sagar Mela 2016, which is unquestionable a brilliant
effort to promote public participation in Sustainable Development but the same point is also here, that it does not ensure sufficient effort for women participation in Sustainable Development. The increasing belief is that, development policies that do not involve women and men alike will not be successful in the long run. Eventually, the speed of the globe back-geared by the backwardness of women-folk; in this situation the issues regarding women involvement claims its priority first. Education as a tool to achieve Sustainable Development would be used with an integrated approach through its formal (schools, educational institutions) and informal agencies (club, local govt. ect.), although educational institution itself could respond as key-mobilizer for community enrichment. Different women environmental movements inspired the fact that by bringing women more actively in environmental decision making at all levels and thus to the centre-stage of Sustainable Development (Tiwari). Finally, it have to accept that unless the human resources are well oriented and trained, their brains are shaped by education and the attitude are modelled to environmental protection policy, not much gains would be reaped by slogans (De).

7.6 Limitation of the Study:

The researcher tried to take best care to follow proper methods and techniques for the study, yet there were some limitations that needs to state honestly to serve the following purposes:

- To exhibit the shortcomings of the study;
- To flash out the difficulties encountered during the course of investigation that could be helpful to future researchers.

The limitations identified by the researcher were outlined below:

- The researcher was concerned with identifying determinants of Environmental Awareness and participation in Sustainable Development, which would lead to sustainable behaviour. For this
the researcher chose three variables namely vulnerability, profession and qualification that could influence or mobilise Environmental Awareness and participation in sustainability. As such, the factors under the study might have no contribution to the sustainable expression.

- In this study the researcher considered only environmental dimension of sustainability. Social and economic dimensions of Sustainable Development also required to study Sustainable Development.

- Judgement sampling technique had been followed to select samples. Researcher considered women from low, moderate and high vulnerable zone belonging different educational qualification- pre-primary to post-graduate and classified with involvement in SHG or non-SHG, from four islands of Sunderban delta, coastal plains of West Bengal.

- The researcher could not apply her tests on a large sample but conducted an intensive study on a sample of 561 women.

- The researcher developed three different test based on ‘Vulnerability assessment scale’, ‘Environmental Awareness scale’ and ‘Environmental behaviour scale’ of selected samples. Though the tests were standardized and worked satisfactorily but the number of dimensions and items of the test might be extended for better appraisal.

- The standardization of the tests was carries out by using only Test-retest methods for ensuring reliability. The researcher felt that use of more methods for this would yield better results.

- The validity of the prepared test was determined by using Content validity only. Use of more relevant methods for the purpose was necessary.
7.7 Suggestions for Further Research:

As the study revealed knowledge gaps in this field, several pertinent topics coming up with a relevancy for further research work. These include the followings:

- Comparative studies to compare Environmental Awareness and participation in Sustainable Development of women belonging different environmental risk zones (hill area, mining zone) and low risk zones and also comparison between women of different socio-economic background to find the effects of natural environmental and socio-economic factors in developing their awareness and participation.

- Replication of the present study can be administered to a large sample or with different attribute variables to find the responsible factors of Environmental Awareness and participation in Sustainable Development.

- Studies compiled social, economic along with environmental dimensions of Sustainable Development may also be done to identify different factors under these indicators of Sustainable Development.

- Studies to modify and restandardise the tools used by the researcher for measuring different attributes more effectively and accurately. Studies may also be done to develop suitable scales to fulfil the need of measuring such attributes over a large population of women.

- Studies to critically analyse the existing syllabi of environmental education for the curriculum of different stages in respect of their effectiveness.

- Studies to critically analysis the existing teaching-learning techniques of environmental education at different stages and its effectiveness to achieve Environmental Awareness and participation in Sustainable Development.
Discussion

- Studies regarding Sustainable Development in relation to Environmental Awareness, attitude and behaviour provide a rich field for further study.
- Studies that compare the Environmental Awareness and participation in Sustainable Development among women of different age groups to find the growth and development of environmental concept and behaviour through ages.
- Experimental studies, case studies may conduct to evaluate and understand the effects informal educational agencies to promote Environmental Awareness and sustainable behaviour.
- Studies may also be carried out to find how Environmental Awareness could be generated and sustainable behaviours formed.
- Studies that compare between the male and female participation in Sustainable Development and other environmental issues.
- Studies could also be carried out to find how women participation in environmental, social and economic sustainability enhanced and its effects, which is one of the most important areas for further research.