Nature Environment and Pollution Technology © Technoscience Publications	Vol. 7	No. 2	pp. 211-218	2008

A SURVEY OF SCHOOL STUDENTS' KNOWLEDGE AND ATTITUDE ABOUT THE GLOBAL WARMING

Animesh K. Mohapatra* and Reena Mohapatra
*Department of Zoology, Regional Institute of Education (NCERT), Ajmer-305 004, Rajasthan

ABSTRACT

In a world where Man is aggressively competing with fellow Man for political and economic superiority, his concern for the well being of the earth upon which he lives, and the earth upon which he depends for his shelter and sustenance is being overlooked. This study is an attempt to contribute to the growing body of knowledge about senior secondary students' conceptions and views concerning global warming. The results of the present study show significant differences in understanding level of boys and girls on various concepts of global warming. There is a degree of uncertainty in students' minds as to what exactly causes global warming and what they could and should do to check it, though students generally seemed well informed about carbon dioxide and CFCs as greenhouse gases, global warming makes the earth hotter and causes melting of polar ice and it can be reduced by planting more trees.

INTRODUCTION

The phrase 'global warming' has become familiar to many people as one of the important environmental issues of the present day. Many opinions have been expressed concerning it, from the doom-laden to the dismissive. It is well upon the current political agenda. There are urgent questions every one is asking:

- Are human activities altering the climate?
- Is global warming a reality?
- How big are the changes likely to be?
- Will there be more serious disasters and will they be more frequent?
- Can we adapt to climate change or can we change the way we do things so that we can slow down the change or even prevent it occurring?

In discussion of global warming up to a one and half decade ago (Lanouette 1990a, Neuzil 1995), there was still some disagreement among the science community about whether atmospheric pollution really was causing the warming of the earth by an exacerbation of the green house effect (Gribbin 1990). Nowadays, few scientists would reject the evidence for an increase in global warming (Schneider 1989). Politicians have also largely accepted the reports of international committees which apportion blame to anthropological activity (IPCC 1996), and governments generally recognize the need for international action to attempt to stabilize and then reduce the levels of the atmospheric pollutants responsible. In addition, there have been impressive images in the popular media, for example, of extreme adverse weather conditions and polar ice cape melting, which have been linked with an increase in global warming. Global warming has also become an issue for discussion in science class rooms (Gayford 1995). In light of the increased acceptance of an exacerbation of global warming among experts, and the increased profile of the phenomenon among the general public, young adults would now be better informed about the causes, potential consequences and possible cures of global warming. The aim of the present study was to determine whether the present generation of young adults is better informed about the issues which surround this increasingly

important environmental problem.

PROCEDURE

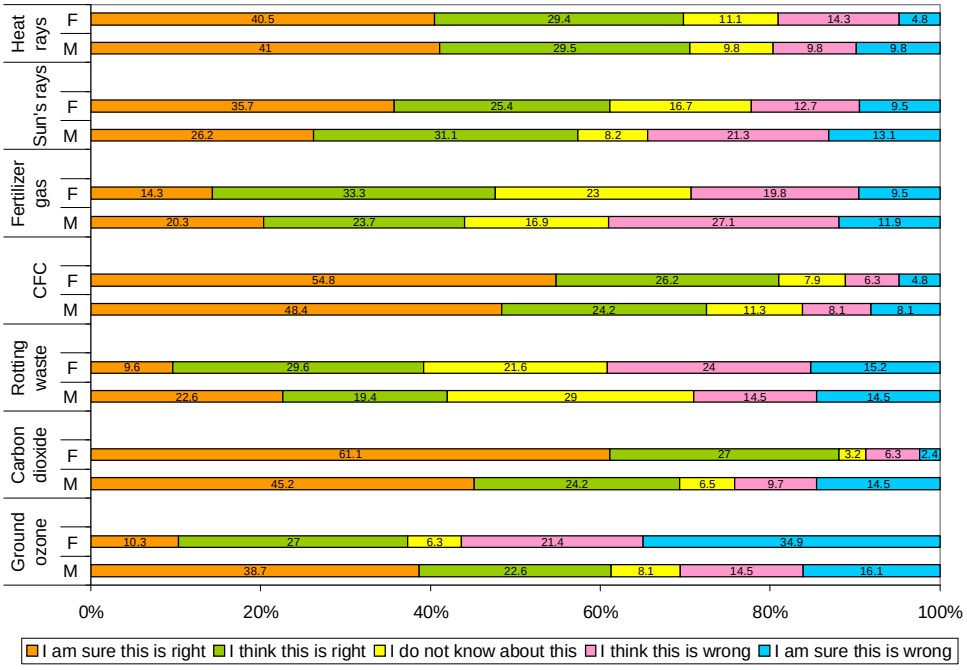
With the main objective of assessing and comparing the level of understanding of boys and girls about global warming, senior secondary students from various schools of Ajmer (Rajasthan) were used as sample for the present study. A closed form questionnaire of 39 questions prepared following Boyes and Stanisstreet (1992) was used during the study. The closed form questionnaire, which is in the form of statements to which the senior secondary boys and girls were asked to respond by ticking boxes labelled 'I am sure this is right,' 'I think this is right,' 'I don't know about this,' 'I think this is wrong' and 'I am sure this is wrong'. The items were arranged in three sections, about real and possible causes, about real and possible consequences of an exacerbation of the global warming, and about real and possible cures. Within each section scientifically acceptable and scientifically unorthodox statements were interspersed at random.

The questionnaire was administered during free classes. Students completed the questions as individuals, but were assured of anonymity. The results were transferred an encoded data into a data file for analysis using SPSS. Differences between the results of boys and girls were explored by Chi-squared analysis. In order to do this, the two positive responses ('think right' and 'sure right') were combined to provide a measure of the proportion who affirmed an idea. Similarly, to indicate those who did not affirm an idea, the other three responses ('don't know,' 'think wrong' and 'sure wrong') were combined.

RESULTS AND DISCUSSION

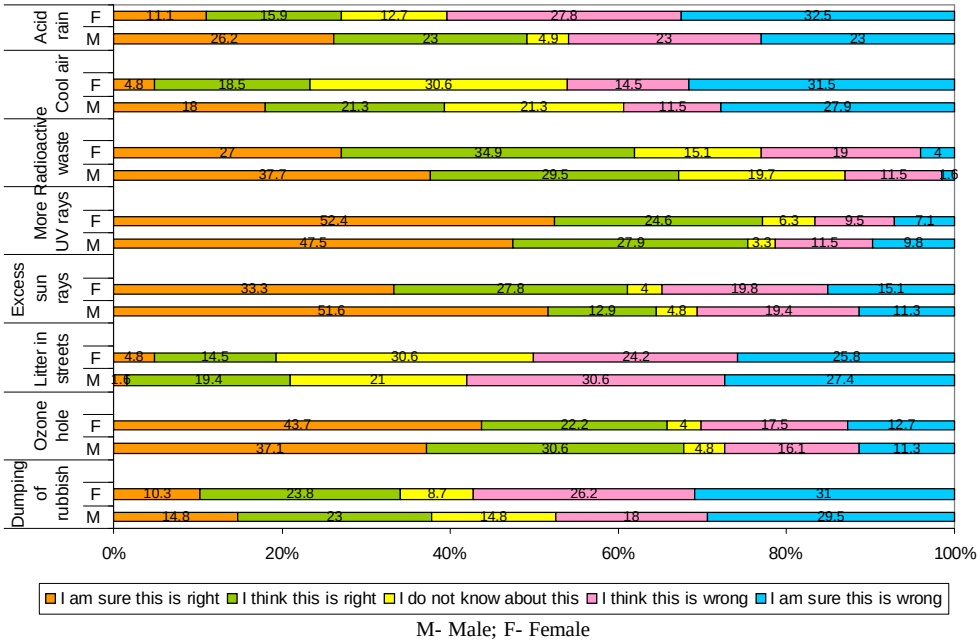
A total of 564 senior secondary students comprising of 46 percent boys and 54 percent girls completed the questionnaire. The responses to the questionnaire about the causes, consequences and cures of global warming are shown graphically in Figs. 1-6. Here, the left hand lightly shaded segments represent 'sure right' responses; the next, lighter shaded segments the 'think right' responses; the lighter shaded central segments the 'don't know' responses; the right handed darkly shaded segments the 'think wrong' responses; and the right hand darkly shaded segments the 'sure wrong' responses. Figs. 1, 3 and 5 show students' responses to scientifically orthodox statements, whilst Figs. 2, 4 and 6 show responses to scientifically unorthodox statements.

Students' knowledge about real and possible causes of the global warming: The distribution of students' ideas about real and possible causes of the global warming are shown in Figs. 1 and 2. There was no significant differences in opinion between male and female students in relation to various scientific statements such as role of chemical gases from rotting waste (42%M and 39.2%F), CFCs (72.6%M and 81%F), fertilizer gases (44%M and 47.6%F), solar radiation (57.3%M and 61.1%F) and heat rays (70.5%M and 69.9%F). However, there was significant difference in the responses about the role of ground ozone (61.3%M and 37.3%F, $p<0.01$) and carbon dioxide as green house gas (69.4%M and 88.1%F, $p<0.01$). The investigators suspect that both boys and girls may be employing a false chain of reasoning here, knowing that CFCs are the major agent responsible for ozone layer degradation (Boyes & Stanisstreet 1994) and conflicting their thinking about the phenomena of ozone layer destruction and global warming (Boyes & Stanisstreet 1997). Surprisingly majority of boys and girls could not appreciate that the gas from rotting waste (in reality, methane) contributes to global warming. In comparison to boys, very less girl students appreciated that ground level ozone contributed to global warming. It may be that girl students, being aware of



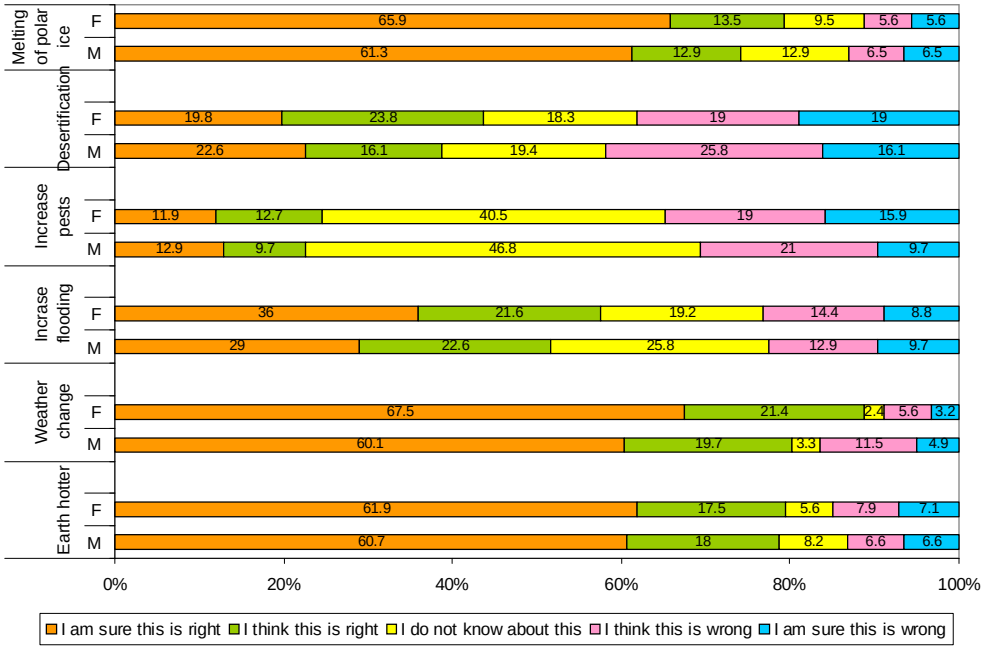
M- Male; F- Female

Fig. 1: Comparison of gender responses to scientifically acceptable statements about the causes of global warming.



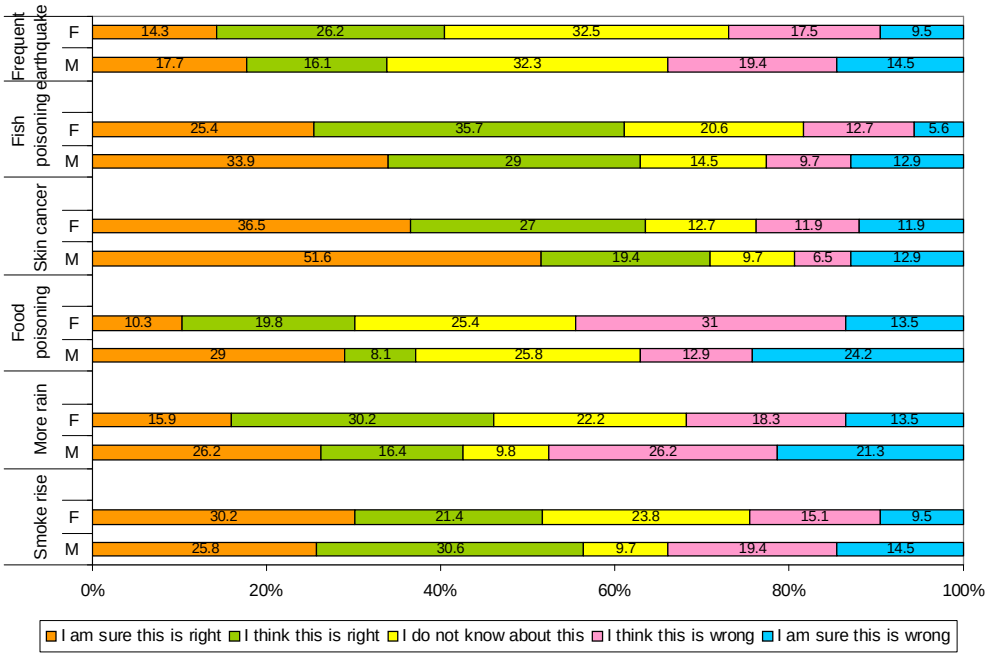
M- Male; F- Female

Fig. 2: Comparison of gender responses to non-scientific statements about the causes of global warming.



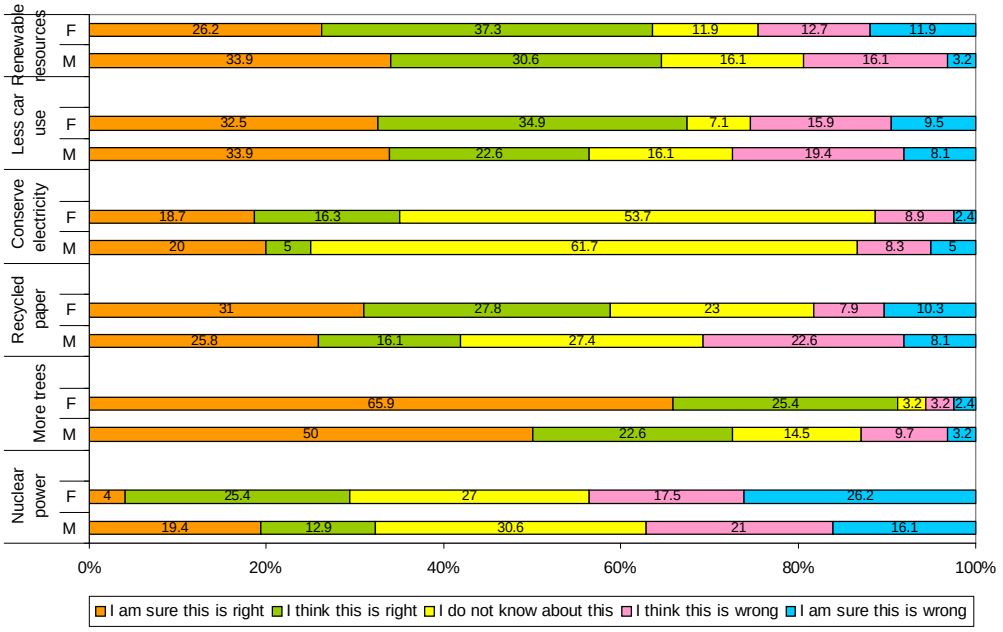
M- Male; F- Female

Fig. 3: Comparison of gender responses to scientifically acceptable statements about the consequences of global warming.



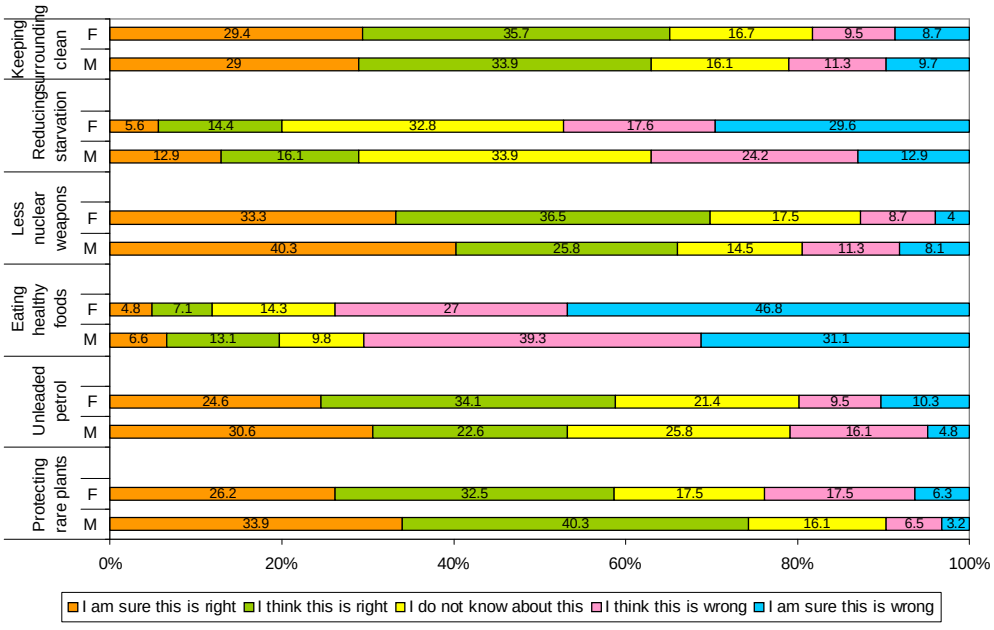
M- Male; F- Female

Fig. 4: Comparison of gender responses to non-scientific statements about the consequences of global warming.



M- Male; F- Female

Fig. 5: Comparison of gender responses to scientifically acceptable statements about the cures for global warming.



M- Male; F- Female

Fig. 6: Comparison of gender responses to non-scientific statements about the cures for global warming.

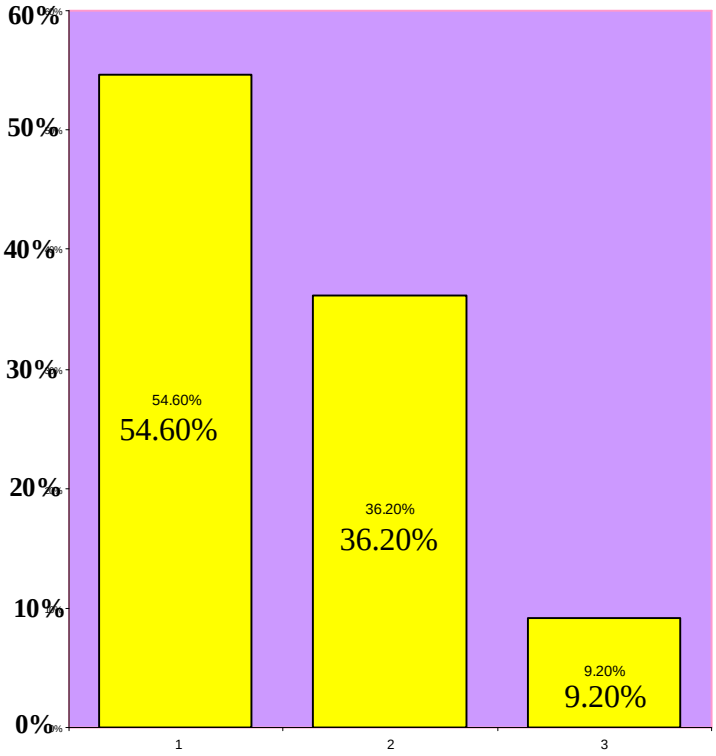


Fig. 7: Students responses about their feelings on global warming.

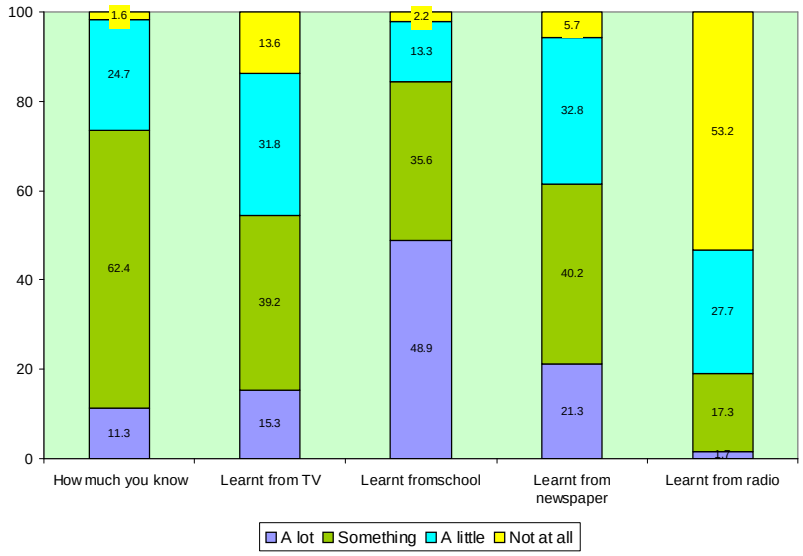


Fig. 8: Students responses to questions about their self-perceived knowledge and source of information about global warming.

the problems consequent on depletion of the ozone layer, to accept that a substance ozone, which is 'beneficial' and therefore 'good' in the stratosphere can be 'deleterious' or 'bad' at lower levels of atmosphere. Jeffries & Stanisstreet (2001) also reported similar results while studying the knowledge of year 1 students of British University about 'greenhouse effect'.

Majority of students of both the sexes affirmed equally to the role of UV rays (75.4%M and 77%F), radioactive waste (67.2%M and 61.9%F), excess sun's rays (64.5%M and 61.1%F) and ozone hole (67.7%M and 65.9%F) as possible causes of global warming. Significant difference was observed in the responses by male and female students to the possible role of acid rain in global warming (49%M and 27%F, $p<0.01$). Majority of boys and girls made an erroneous connection between UV rays, radioactive waste and ozone hole with global warming.

Students' knowledge about real and possible consequences of global warming: The responses of questionnaire statements on consequences of global warming are shown in Figs. 3 and 4. There was no significance difference in responses between male and female students understanding about scientifically acceptable statements. However, very less boys and girls knew that global warming would increase the population of 'bugs' and 'pests' on crops (Jeffries & Stanisstreet 2001).

Significant differences were observed in response to non-scientific statements that global warming is associated with increase in levels of smoke ($p<0.05$) and more rains ($p<0.05$). The most common misconception, however, held by three-fifth of the boys and girls, was that an increase in the global warming would result in a rise in the incidence of skin cancer (71%M and 63.5%F) and fish poisoning (62.9%M and 61.1%F).

Students' knowledge about real and possible cures of the global warming: Figs. 5 and 6 present the result of male and female responses to possible cures and remedial measures of global warming. No significant difference was observed between the male and female students' responses on scientifically acceptable statements about the cures of global warming. However, significant difference was observed in the opinion of male and female students about the possible role of plantation of trees to check the global warming. 91.3% female students against 72.6% male students believed plants can check global warming. Most of the students understood that reduced use of vehicles and generation of electricity from renewable resources would check global warming. However, majority of boys and girls are unaware about the fact that use of more nuclear power instead of coal power and by conserving electricity, global warming can be made smaller.

No significant difference was observed in the results of non-scientific statements. As one might expect, there was little confusion between an increase in the global warming and the use of healthy foods (11.8%M and 19.7%F) or reduction of global starvation (29%M and 20%F). The most common misconception, however, was the belief that protecting rare plants, use of unleaded petrol and keeping surrounding clean would reduce global warming. Jeffries et al. (2001) revealed similar trend while studying British students' idea of global warming.

STUDENTS' CONCERN ABOUT GLOBAL WARMING AND SOURCE OF KNOWLEDGE

Students concern about global warming and source of knowledge are shown in Figs. 7 and 8. Majority of the students were geartly worry (54.60%) for global warming. Only 9.20% of the students were not at all concerned with global warming. Regarding their source of knowledge, it seems that most of them have acquired knowledge of global warming from school, newspapers and T.V.

CONCLUSION

Though the results of the present investigation reveal that girls are more wary than boys on the causes, consequences and cures of global warming, however, there exist areas of insecure knowledge in many of the students studied. The investigators believe it is important that further research be undertaken to tackle the issue of the education of children about major environmental issues. This may well involve more research into their knowledge, understanding and attitudes, and also into the relationship between the cognitive and the affective domains when dealing with the global environment.

ACKNOWLEDGEMENT

The authors are greatly indebted to Prof. V. G. Jadhao, Principal for providing necessary research facilities. We would like to thank ERIC Project Committee (NCERT) for approving the research proposal and providing financial support for this study.

REFERENCES

Boyes, E. and Stanisstreet, M. 1992. Students' perceptions of global warming. International J. of Environmental Studies, 42: 287-300.

Boyes, E. and Stanisstreet, M. 1994. The ideas of secondary school children concerning ozone layer damage. Global Env. Change, 4: 311-324.

Boyes, E. and Stanisstreet, M. 1997. Children's model of understanding of two major global environmental issues (ozone layer and greenhouse effect). Research in Science and Technological Education, 15: 19-28.

Gayford, C. 1995. Science education and sustainability: A case study in discussion based learning. Research in Science and Technological Education, 13: 135-145.

Gribbin, J. 1990. An assault on the climate consensus. New Scientist, 15 December, 1990: 26-31.

IPCC 1996. Reports of the intergovernmental panel on climate change. IPCC Secretariat, C/o World Meteorological Organization, 7 bis Avenue de la Paix, C.P. 2300, CH 7211 Geneva 2, Switzerland (www.ipcc.ch).

Jeffries, H. and Stanisstreet, M. 2001. Knowledge about the "greenhouse effect' : have college students improved. Research in Science and Technological Education, 19(2): 205-220.

Lanouette, W. 1990a. Global warming: how much and why? Bulletin of the Atomic Scientists, 46: 38-39.

Neuzil, M. 1995. Mass media and global warming: A public arenas model of the greenhouse effect's scientific roots. New Jersey Journal of Communication, 3: 118-132.

Schneider, S.H. 1989. The changing climate. Scientific American, 261(3): 70-79.