



Tourism and Marine Ecosystem Threats to the Great Barrier Reef & some suggestions:

A case study of Cairns Region (Australia)

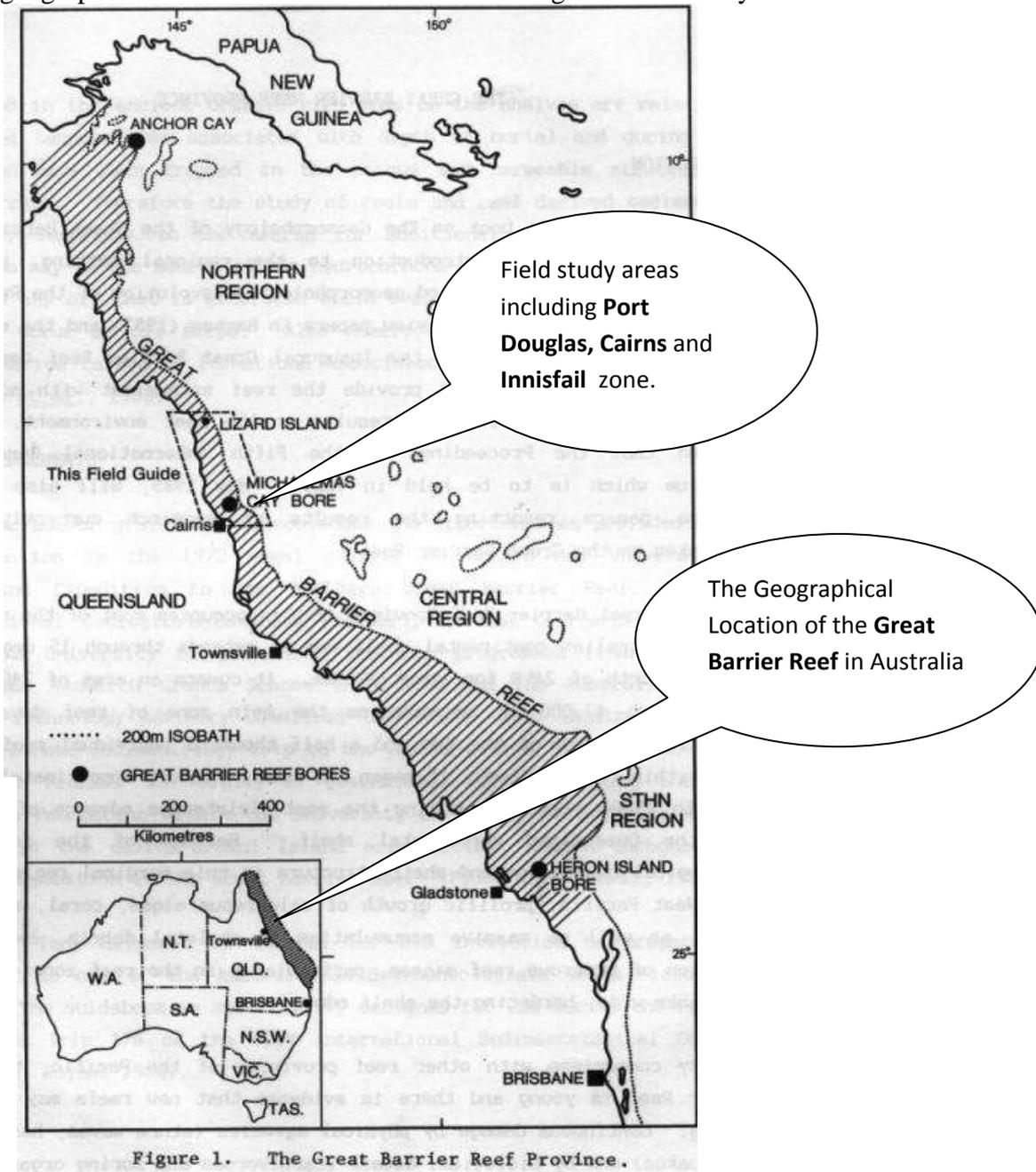
Written By:

Dr. Jagbir Singh, Associate Professor, Dept. of Geography, University of Delhi, India.
Email: drjagbirs@gmail.com, kakroi@hotmail.com

Introduction:

The world's oceans cover more than 70% of our planet's surface and the rich web of life they support is the result of hundreds of millions of years of evolution. Nomadic peoples were collecting shellfish and harvesting fish long before the dawn of settled agriculture. Great human civilizations, from the Egyptians to the Polynesians relied on the sea for commerce and transport, and now, at the end of the Twentieth Century, our fate is as tied to the oceans as ever. We still rely on fish for a significant portion of our daily protein needs, and more than \$500 billion of the world's economy is tied to ocean-based industries such as coastal tourism and shipping. Australia is an island continent with an extensive tropical coastline. Its western shores mark the southeastern margins of the Indian Ocean while, to the east, it provides the southwestern boundary of the Pacific Ocean. Between these two is a complex, poorly known, northern coastline which runs close to southern Indonesia, separated by the Timor Sea to the west and the Arafura Sea to the east. After Indonesia, Australia has the largest area of coral reefs of any nation, nearly 50 000 square kilometers, or some 19 percent of the world's total area of reefs. Conditions for reef development vary considerably along the coastline. In the far west the climate is dry and there is little terrestrial runoff. Reef development is not continuous, though away from loose coastal sediments there are important areas, including Australia's best developed fringing reefs. The southward flowing Leeuwin Current is also important on this coastline, bringing warm waters to relatively high latitudes and enabling the development of some unique reef communities. Further north there are several reefs on the outer edges of the continental shelf. These include remnants of what may have been a substantial barrier reef structure drowned as a result of rising sea levels over geological time scales. The northern coastline is less known, however this is an area of high terrestrial runoff, and the waters are shallow and turbid, greatly restricting reef development. The eastern boundary of the Arafura Sea is marked by a narrow constriction, the Torres Strait. East of here, the world's largest coral reef complex commences, extending out to the margins on the continental shelf and continuing southwards as the Great Barrier Reef. The warm, southward flowing East Australia Current also supports the development of high latitude reefs along Australia's eastern shores to the south of the Great Barrier Reef. Other reefs are found in Australia's offshore waters. Most notable among these are the extensive reef structures of the Coral Sea, east of the Great Barrier Reef. Perhaps most importantly, this vast mass of water acts to help regulate the global climate and to ensure that a constant flow of vital nutrients is cycled throughout the biosphere. But all is not well in the sea. Increased pressures from overfishing, habitat destruction, pollution and the introduction of invasive alien species have combined in recent decades to threaten the diversity of life in estuaries, coastal waters and oceans. Now a new threat, global warming, is making itself felt, and its impacts could be devastating for life in the sea.

The paper shows the tourist's perception on the different environmental and ecological problems of the GBR. The major objective of this research was to investigate and describe the knowledge and attitudes of many different tourists visiting the GBR. This study has proven to be successful because it provides much information about the activities of the average tourists together with their perception of many different aspects of the GBR. To give feedback, and to create a new sustainable approach for touristic activity on the GBR, the Govt. of Australia must develop a new sustainable approach and here the role of local community farmers and school children must play a leading role. The map below shows the geographical area of the Great Barrier Reef along with field study area





In the case of Green Island near Cairns, many tourists come from Japan, China and other Asian countries and they disturb the marine ecology of the GBR by touching, urinating and stealing the coral and having a total lack of environmental awareness. This is partly due to their lack of the English language and this in turn has become another present and future threat to the coral reef ecosystem. In this zone out of 428 tourists including Port Douglas and Green Island 260 were international tourists (77 from Cairns, 149 from Green Island and 34 from Port Douglas) and the remaining 90 tourists were made up from the Cairns area (12 local school children, 5 local laymen, 10 national tourists and 28 local farmers including Innisfail). Green Island (20 local school children, 20 local laymen, 32 national tourists) and Port Douglas (no local school children, 2 local laymen, 8 national tourists and no local farmer). They have all been intensely surveyed and the table below shows the list of the total tourists surveyed on the GBR in different places in the Cairns Region.

Country of Origin	Cairns	Green Island	Port Douglas	Total no. of Tourists	Total no. of % age
Japan	22	48	10	80	18.691589
China	4	18	2	24	5.6074766
Vietnam	5	10	3	18	4.2056075
South Korea	5	16	5	26	6.0747664
India	2	5	3	10	2.3364486
Canada	6	18	2	26	6.0747664
Germany	5	24	21	50	11.682243
U.S.A	8	15	5	28	6.5420561
U.K	15	20	6	41	9.5794393
Scotland	10	13	2	25	5.8411215
National Tourists	10	14	8	32	7.4766355
Local Laymen	15	2	3	20	4.6728972
Local Farmers	28	0	0	28	6.5420561
Local School Children	12	6	2	20	4.6728972
Total	147	209	72	428	100

(Source: Field Survey)

The field study shows that Green Island is the most attractive center for all the tourists in the Cairns region particularly the Japanese. Out of 428 tourists surveyed including local farmers, only 209 tourists were surveyed on Green Island. Most of the tourists came from all over the world but the majority of the tourists who came from Japan, Korea and other Asian countries, had a poor background in the English language and they hardly understand the any information which is provided by the



The table below shows the tourists & who accompanied them to the GBR

Country of Origin	Family	Friends	Partner/Spouse	Alone	Others	Total no. of Tourists
Japan	10	12	47	6	5	80
China	0	18	4	0	2	24
Vietnam	3	15		0	0	18
South Korea	1	7	14	1	3	26
India	5	1	4	0	0	10
Canada	2	10	12	2	0	26
Germany	10	15	22	3	0	50
U.S.A	2	5	12	4	5	28
U.K	7	11	12	6	5	41
Scotland	8	2	10	5	0	25
National Tourists	15	4	5	6	2	32
Local Laymen	3	7	8	0	2	20
Local School Children	12	0	0	0	8	20
Total	78	107	150	33	32	400

(Source: Field Survey)

The table above shows that the majority of the visitors to the GBR came either as a couple or in groups with their friends. Very few came alone and out of 400 tourists (excluding local farmers), 150 came with their spouse.



The table below shows the major reasons for choosing a tour to the GBR in the Cairns Region

Reasons for choosing a tour	Total no. of Tourists	Total no. of % age	Preferences
Snorkelling	389	97.25	1
See the coral and other marine life	311	77.75	4
Package tour convenience	180	45	8
See Australian countryside	140	35	9
To experience something new and different	273	68.25	6
To escape from the normal routine	265	66.25	7
Price matched my budget	330	82.5	3
Time suited my schedule	279	69.75	5
Will you come again?	352	88	2
Total	400	100	0

(Source: Field Survey), Multiple choices were allowed.

To analyse and understand the reasons why different tourists chose a tour to the GBR, the study shows that out of 400 interviewed, 389 tourists came for snorkelling, 311 came to see the coral and other marine life and multiple choices were allowed. The above table shows that the majority of tourists came for snorkelling and Green Island proved to be the main area for snorkelling on the GBR. 352 tourists out of 400 said that they would like to come again. All of this shows that the tourism industry has a tremendous scope for expansion in this region.

The table below shows the tourist's activities on the GBR in the Cairns Region

Major Activities	Total no. of Toursits	Total no. of % age	Preferences
Snorkelling	321	80.25	1
Going to the beach	124	31	6
Fishing	76	19	8
Pubs, Clubs and Discos	187	46.75	3
Guided tour or excursions	152	38	4
Going Shopping	59	14.75	9
Visiting National or State Parks	121	30.25	7
Picking up Coral as a souvenir	148	37	5
Scuba diving	210	52.5	2
To see the Green Island	321	80.25	1
Total	400	100	0

(Source: Field Survey), Multiple choices were allowed.



In the Cairns region, almost all of the tourists went for snorkelling, except elderly people. 80% did snorkelling according to this survey and 80% visited Green Island where multiple choices were allowed. 46% of the tourists enjoyed the Pubs, Clubs and Discos. 52% went Scuba diving and surprisingly out of 400, 148 people picked up coral as a souvenir which shows their ignorance of the law.

The table below shows the tourist's perception of the environmental threats to the GBR

Major Environmental Problems	Total no. of Tourists	Total no. of % age	Preferences
Ocean pollution	53	12.38317757	7
Ballast water discharge from ships	33	7.710280374	4
Fishing	76	17.75700935	3
Crown-of Thorns Starfish	54	12.61682243	6
Water quality-fresh water with sediment in the river systems entering the sea coast	65	15.18691589	5
Tourism and recreation	165	38.55140187	2
Increasing sea level	65	15.18691589	5
Global warming	213	49.76635514	1
Total	428	100	0

(Source: Field Survey), Multiple choices were allowed.

Regarding the tourist's perception of threats to the GBR where multiple choices were allowed, out of 428 interviewed, 213 tourists gave first preference to Global Warming and 165 gave preference to Tourism and Recreational activities as the main cause of the deterioration of the GBR's ecosystem. This shows that the tourism industry is threatening the GBR.



The table below shows the main suggestion by tourists to save the GBR

Major Steps	Total no. of Tourists	Total no. of % age	Preferences
Provide multi-language pamphlets for International tourists	342	79.9065421	1
Through advertising from T.V, Magazines and Newspapers	98	22.8971963	7
Should the use of the internet be more directed to the layman's level	134	31.3084112	5
Start a radio programme on the GBR	34	7.94392523	11
Provide more up-to-date literature in all libraries throughout Australia, including displays	54	12.6168224	10
Should school excursions to the GBR be more encouraged	78	18.2242991	8
Should a mobile information bus be introduced?	132	30.8411215	6
Provide a room for a continuous T.V documentary together with a viewer's souvenir certificate	221	51.635514	2
Provide more posters to school children	98	22.8971963	7
Organize an annual international travel agent's conference on the GBR	154	35.9813084	4
Museum displays	76	17.7570094	9
More involvement of the local community	214	50	3
Total	428	100	0

(Source: Field Survey), Multiple choices were allowed.

To analyse the tourist's suggestions to save the GBR, 342 tourists out of 428 surveyed, suggested that the use of multiple language pamphlets are needed in order to save the GBR from further deterioration. 214 people said that more involvement by the local community is necessary in all aspects of education both at a local and school level.



The table below shows the tourists & their gender ratio on the GBR

Country of Origin	Male	Total % age of Male	Female	Total % age of Female	Total no. of Tourists
Japan	60	26.78571429	20	11.36363636	80
China	20	8.928571429	4	2.272727273	24
Vietnam	16	7.142857143	2	1.136363636	18
South Korea	24	10.71428571	2	1.136363636	26
India	4	1.785714286	6	3.409090909	10
Canada	15	6.696428571	11	6.25	26
Germany	20	8.928571429	30	17.04545455	50
U.S.A	12	5.357142857	16	9.090909091	28
U.K	11	4.910714286	30	17.04545455	41
Scotland	5	2.232142857	20	11.36363636	25
National Tourists	15	6.696428571	17	9.659090909	32
Local Laymen	14	6.25	6	3.409090909	20
Local School Children	8	3.571428571	12	6.818181818	20
Total	224	100	176	100	400

(Source; Field Survey)

To understand the gender ratio of tourists on the GBR, out of 400 surveyed, 224 were male and 176 were female. In the case of Germany, UK and USA, there were more females than males visiting the GBR.

Table below shows the educational status among the tourists in the Cairns Region

Educational Status	Total no. of Tourists	Total no. of % age
High School	110	27.5
TAFE	45	11.25
University	168	42
Others	77	19.25
Total	400	100

(Source: Field Survey)



In observing the educational status of different tourists, 40% had a University Degree, 27% finished at High School and this shows that in spite of their educational level, they showed no interest or awareness of how their activities were damaging the GBR.

The below table shows the duration of different tourists stay in the Cairns Region

Country of Origin	Duration of Stay		Total no. of tourists	< One week %age	>One week % age
	<One week	>One week			
Japan	20	60	80	13.422819	2.8368794
China	20	4	24	13.422819	5.6737589
Vietnam	10	8	18	6.7114094	4.2553191
South Korea	20	6	26	13.422819	1.4184397
India	8	2	10	5.3691275	14.184397
Canada	6	20	26	4.0268456	19.148936
Germany	23	27	50	15.436242	14.184397
U.S.A	8	20	28	5.3691275	21.276596
U.K	11	30	41	7.3825503	15.602837
Scotland	3	22	25	2.0134228	8.5106383
National Tourists	20	12	32	13.422819	0
Local Laymen	0	0	20	0	0
Local School Children	0	0	0	0	0
Total	149	211	380	100	100

(Source: Field Survey)

The majority of tourists stayed in the Cairns region for more than one week. 149 out of 380 stayed less than one week. It is important to notice that when tourists stay for longer than one week, they may make two or three visits to Green Island and harm the GBR.

How to create ecological and environmental awareness among local, national and international tourists and save the marine ecosystem:

The Great Barrier Reef is a precious gift from nature and it is our duty to protect and preserve it for our future generations. It is very important to send a message to local, national and international levels of authority to protect the reef. Although the Australian Government and other agencies have done a lot of work, more needs to be done in this direction. To create more public awareness regarding the Great Barrier Reef's Protection, we should follow a few steps by which the Great Barrier Reef might be saved. After an intensive field survey of local, national and international people, my study shows how much urgency is needed to educate people in the following ways.



The planning of reef management for each region or locality must seek local public involvement in ways most suitable to its own special conditions, and all of the following practices may be useful in achieving this:

- Provide multi-language pamphlets to all International Tourists arriving at Australian Airports and then further to Domestic Terminals and many tourists (such as the Japanese, Chinese, Taiwanese, Indian, Russian, German, Swedish and Finnish) and people from non English speaking backgrounds, cannot comprehend the pamphlets in English. It would be more effective to save the Great Barrier Reef if they receive information in their own language. Visual signs showing that the breaking and stealing of coral is forbidden with it heavy fines, should be placed in all swimming and snorkeling areas. On Green Island many international tourists were observed to be proudly stealing and being photographed with their stolen coral . Greater policing is necessary.
- Create more awareness in advertising through the medium of TV, magazines and newspapers. The Government of Australia should start a monthly television programme on how to save the GBR from further deterioration, and publish a special monthly magazine on different environmental aspects of the GBR. Local, national and international newspapers need to take a greater interest in publishing more articles relevant to the GBR. Out of 100 people interviewed in Cairns ,90% of the tourists agreed that such TV and newspaper publicity could play a vital role in saving the GBR. The farmers themselves should be receiving a monthly newsletter updating pollution levels to the GBR and they can prevent further deterioration of the water quality by using fewer chemicals and fertilizers.
- Local community involvement should begin at school level in both a practical and a theoretical sense. Australia is a country where compulsory education is up to Year 10, and this stresses the importance of educating the local community at School level to make them aware of the ecological and environmental problems of the GBR. Most coastal towns are dependent on the Tourism Industry and practical knowledge, which the children have learnt at School, will not only help them in their future jobs, but through their knowledge, there will automatically be a sustainability created.
- The use of the Internet should be more widely publicised. In the modern era of Information Technology, it has become very easy to access literature on any topic. In spite of the fact that already there is much information on the GBR for scientists, there needs to be other information that is more understandable for the general public in regard to creating an interest for a visit and providing an awareness of the problems of the GBR.
- Radio Talk-back Programmes in Australia reach millions of people all over the world day and night. People from Europe, Africa and the Americas are free to ring at any time to divulge their opinions, ideas, experiences and suggestions on any topic and they automatically receive an instant reply. These replies in their turn cause other people to take an interest in what is being said and in their turn, comment further on each topic.The Government as well as private enterprise should give more financial backing to radio programmes about the GBR in order to create more awareness. Once or twice a month a GBR programme about awareness could be broadcast.
- More scientists from Coral Reef Nations should be involved in an International Project on researching the problems of the GBR.Once these scientists have seen for themselves what has been done to save the GBR in Australia, they will be better equipped to understand and solve the problems of their own reefs. Their knowledge would then create a new awareness among the local people of their own region.
- Organize an annual International Conference on Coral Reefs focusing on the GBR. The best platform for creating an awareness at both an International and Local Level is at an International Conference where scientists from different backgrounds could give their research findings and gain further informative knowledge from other scientists.
- Books and literature in all local libraries throughout Australia should be up-to-date. The general public should have the right to be correctly informed of the most up-to-date scientific



findings of all aspects of critical issues facing the GBR. Unfortunately, many libraries have outdated shabby books and magazines which are not helping to create an enthusiastic and caring approach in order to awaken interest in the GBR. Information pamphlets on the GBR should also be distributed to all libraries.

- School excursions to the GBR should be encouraged. These excursions would provide the practical aspects of all the theoretical knowledge, which has already been taught in the classroom. It would be good if there could be an exchange programme introduced to cultivate nationwide and worldwide awareness of Australia's richest heritage-the GBR.
- A mobile information bus. Through such a bus, local and international tourists could more easily gain vital information needed on how to save the GBR. This bus could provide very interesting half -hour Video Documentaries on the history, ecology, environment and the impact of tourism on the reef. Once people see the result first hand of their impact on the reef, they will become aware and hopefully takes steps to increase their awareness and help save the GBR.
- Attendance certificate as a souvenir. A small documentary theatre should be made available by council, and all people attending a 30 to 45 minute documentary on the sustainability of the GBR, should be provided with a souvenir certificate, thereby being able to recall and sustain more interest in understanding what they have seen in the documentary, and that can be a very good step towards an environmental awareness among the local and international tourists regarding the GBR.
- Better training for cruise operators. It is most important that all tour operators have a full knowledge of the types of coral and fish found at the various Islands to which they travel. This will create a better awareness and should inspire people to visit other islands in order to learn about and contrast the different species of coral and fish found and how they interrelate with each other.
- Distribution of more posters to school children. A great awareness can be achieved by the display of large posters about the GBR on the notice boards of schools and some time should be given to lectures on "How to save the GBR" by the use of power points. Discussion and question time by the students should follow these talks.
- Immediately report any breaking or stealing of coral to the appropriate authority. This also applies to people smoking and throwing their butts away on the sand or in the water. Drink containers, aluminum foil chocolate wrappings and plastic bottles also come under this category.

Conclusion:

There is no doubt that Tourism is a smokeless industry and all nations are in a position to develop their tourism industry as best as they can. Side by side with this fact, we have to recognize that tourism in itself is the major threat to the entire ecological and environmental system of any area. The study reveals that in the Cairns region, most tourists came from all over the world for snorkelling in order to see the coral reef. The majority of tourists in this region are from Japan, China, Korea, Taiwan and other Asian countries. Due to a poor understanding of the English language, they ignore all of the rules and regulations and seem to enjoy their carelessness in destroying the GBR marine ecosystem. Almost all of the tourists think that Global Warming is the only threat to the GBR but they are completely ignorant of the constant damage which they are causing due to their activities. More involvement in the awareness of the environmental problems facing the GBR, has to be encouraged through local communities and in the schools. Only by the use of multi-language publicity will the world be educated in preserving and saving the GBR from any further damage. This study reveals that in the region of Cairns not only the high level of construction is creating irretrievable devastation to the environment but also wrong farming practices are combining here to cause further



threats to the ecological balance of the GBR. From the sky- rail near Cairns, one can see the massive clearing of trees and the over construction is taking place at a rapid rate. Combined with the intensive building construction which is going on at the foreshore of Cairns harbour, all of this construction will prove to have a devastating effect on the future ecology and environment of the GBR. The time has come to think together at a local, national and international level to save not only the marine ecology of Australia but to protect the world's coral reefs which are degrading day by day at a very fast rate. The local community in different areas in the world can be a very useful instrument to create environmental awareness among their surrounding tourists.

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