

The Influence of Environmental Changes on the Micronesian Area: a Case Study of Islands in Pohnpei State, Federated States of Micronesia

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Abstract

Various environmental changes, such as globalization and global warming, have been thought of as important factors that affect local communities and natural environments worldwide. This study focuses on three islands (Pohnpei, Mokil, and Pingelap) in Pohnpei State (one of the four Federated States of Micronesia) and discusses the influence of globalization and global warming on those islands with reference to data developed from observation of the coral reefs and from a questionnaire on food, life-style, local awareness of globalization and global warming, and their effects on the human and natural environments. Based on the results of the survey, this study tries to verify two hypotheses. The first is a “centre-periphery” hypothesis that focuses on the distance between each island and Guam, the developed core (or centre) of the Micronesian region. The “centre-periphery” hypothesis argues that the closer the islands are to an urban center, the more globalized they become; islands that are farther away from the center remain more traditional. The second hypothesis we examined assumes that the effects of global warming on each island are similar in intensity.

The results of our research show that meaningful “centre-periphery” differences exist among the three islands with regards to principal diet. A meaningful correlation can be seen between those islands closer to the center and the consumption of processed foodstuff; in short, the closer an island is to the centre, the more processed foodstuff its residents consume. In general, responses to the questionnaire reveal results that are compatible with the “centre-periphery” hypotheses. There are also results that run counter to the hypotheses we tested. For example, the degree of coral cover on the islands’ reefs differ; this suggests that the hypothesis about the similar intensity of global warming on all islands is not correct. We also discuss which factors have most affected the islands, and we offer an interpretation from an island-centered viewpoint that includes topics such as food, communication, and the natural environment in the Micronesian islands.

Key Words: centre-periphery hypothesis, globalization, global warming interdisciplinary, questionnaire

Introduction

Various environmental changes, such as globalization and global warming, are affecting people's lives on this planet in many significant ways. Because of their small size and delicate ecology, islands are especially affected by such large processes. For example, global warming leads to temperature increases which cause the seas to rise. Low lying lands, such as an atoll which is made of coral, is particularly vulnerable to a rise in sea level. There are many low lying islands and atolls in the Pacific. It has been reported that many may sink below the surface of the water due to global warming (e.g. IPCC 2007). The El Nino effect related to climate change was studied from 1997 to 1998 in the Pacific Ocean area; results of that study showed that it affected the ecosystem, the production of crops, and other environmentally related areas (e.g. DREXLER & EWEL 2001). The increased incidence of typhoons is another consequence of the climate change. Typhoon SUDAL, for example, affected local communities and people's health in Yap State in the FSM (e.g. NAKAJIMA & OHASHI 2004, DURAND *et al.* 2005). Meanwhile, it has been reported that the transition from eating traditional foods to processed foods due to globalization causes people to be obese (EVANS *et al.* 2001, HUGHES & LAWRENCE 2005, CASSELS 2006). Globalization has also affected natural environments in a variety of ways. For instance, the expanded movement of plant and animal life promoted by globalization increases the number of alien species on islands (e.g. ECOLOGICAL SOCIETY OF JAPAN 2002). Because of the complexity of social and natural environments, it is important to understand the impact of changes on them through a focus on human beings' adaptation to these changes and their efforts to maintain their social environment.

Before getting down to specific cases, we offer some general information on the main crops that have long been the staple diet of Micronesian people, especially focused on our research area, and also on the centre-periphery theory which provides the main framework of our analysis.

In the Federated States of Micronesia, the main crops cultivated are yam, taro and breadfruit. On the high island of Pohnpei, giant swamp taro, which is a variety of taro, and yam are mainly cultivated. Giant swamp taro is also grown on the atolls of Pingelap and Mokil, but the cultivation of yam is difficult on the atolls because the soil there is alkaline in quality. Breadfruit is cultivated on all three islands. On Pohnpei, yams have significant ritual and feasting value, more so than other kinds of food. Therefore, the bigger tubers are more highly prized. For giant swamp taro cultivation, swamps with fresh water are necessary. The cultivation generally begins with the construction of a swamp or taro patch. Though several years are needed for the patch to mature, harvesting itself eventually becomes possible all year round, and the size of corms tends to increase year by year. After planting, the rest of the cultivation process for taro is relatively simple. Weeding and fresh water irrigation are required two or three times a year; that's all. On Pohnpei, taro patches are dispersed around

the island, while on Pingelap and Mokil, the patches are located in one place near the center area of the atolls. Fermented food called “mar” is made from breadfruit, and can be preserved and stored for several years. Since food supply from the outside is very unstable on the two atolls, it is important for the islanders to utilize giant swamp taro and mar throughout the year.

With regards to the centre-periphery theory, the model has been used to date as a framework of analysis in various ways and on different scales (e.g. YAMAGUCHI 1975, GHOSH-SCHELLHORN 2006, APPADURAI 2008). The centre-periphery theory has been used in conjunction with other approaches such as diffusionism, subordination theory, and World Systems theory. Diffusionism explains that if the same socio-cultural phenomena are found in distant places, it is because they are transmitted there from a common center. Thus, the shared phenomena can be understood as originating from the center to the peripheral areas.

Subordination theory developed as a critical response to the modernization theory; it argues that the transmission of the rational mind of the West into non-Western societies makes possible the modernization of the latter along lines of development very similar to the West. The relationship between the West and the non-West is based on the centre-periphery axis. The center continues to survive by exploiting the non-West, and the relationship between them does not change.

Immanuel Wallerstein has analyzed the global division of labor as a function of the modern economic World System in which core and periphery relationships are predicated on European colonial expansion arising from historical crises. Europe is posited as the core and its colonies as the periphery (WALLERSTEIN 1974). The theoretical precondition of World System analysis is subordination theory which assumes global cohesiveness and the applicability of the centre-periphery relationship.

Today’s globalization can also be understood within the framework of the centre-periphery model. At first, globalization was seen as the phenomena resulting from the establishment of world simultaneity and rapid standardization by such multinational corporations as McDonalds (RITZER 1996). Then, with the demise of the communist block, globalization was gradually thought of as the consequence of world standardization with the US as the center and the rest of the world as its periphery in the fields of politics, economics, culture, and military relations (NAKAJIMA 2006). Thus, using both subordination and World System theories, it is possible to see the phenomena of globalization as a dominant-subordinate relationship in terms of economics, culture and information flows between a strong center such as the United States and the periphery which consists of all other countries.

The ‘centre-periphery’ theory thus proposes that new attitudes and values are first developed at the social center and then spread towards the social periphery (GHOSH-SCHELLHORN 2006). Our use of the centre-periphery model is based in part on the discussion provided above; however, we also try to reinterpret the centre-periphery theory from the viewpoint of island and atoll peoples. We focus on how influential the commercial products, information, and values are for them rather than on the strength

of the dominant-subordinate relationship in which they find themselves.

Thus, this study tries to explain the results of our research into the aforementioned two hypotheses through observation and the use of a questionnaire. We examine the “centre-periphery” hypothesis by considering the distance between each of the three islands and Guam, the urban center of the Micronesian region (Fig.1). The first hypothesis is that the closer the islands are to an urban center, the more globalized they become, and the farther away they are, the more traditional they remain. This suggests that Pohnpei is more globalized because it is closer to the urban center of Guam, while Pingelap is the farthest from Guam of all three islands and is thus the more traditional. In terms of distance from Guam, Mokil falls between Pohnpei and Pingelap; we need to explain more about the implications of being in this middle or intermediate space. The second hypothesis is that the impact of global warming on each island is similar in intensity (Fig.1). Therefore, this research seeks; 1) to study how globalization and global warming have affected local communities and natural environments on the three islands in Pohnpei State, and 2) to verify the two hypotheses which are both related to socio-cultural and environmental changes.

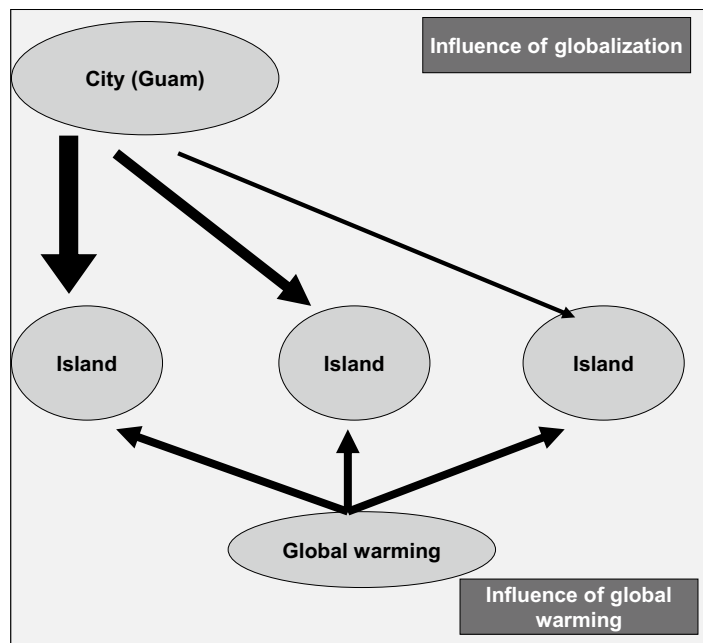


Fig. 1. The two hypotheses tested in this research. One hypothesis deals with the “centre-periphery” hypothesis which considers the distance between each island and Guam, the developed urban core (or centre) of the Micronesian region. The hypotheses stipulates that the closer the islands are to an urban center, the more globalized they are; islands farther away from the center remain more traditional. The second hypothesis tested is that the effects of global warming on each island are similar in intensity. The width of the arrows shows the degree of influence of globalization and global warming.

Methods

Our research was conducted on the island of Pohnpei and the atolls of Mokil and Pingelap, all three of which lie within Pohnpei State which is a part of the Federated States of Micronesia. The time frame for the study was from the 10th to the 28th of November 2008 (Fig.2). We asked dozens of selected household members on each island to answer a questionnaire (Appendix 1) with the assistance of local counterparts. The household survey included questions on general and family background, meals and drinks, life style, and anxiety in everyday life.

In addition to the questionnaire, we carried out research on the natural environment. The ecology of coral atolls is influenced by many environmental factors which in turn are affected by global warming. This includes increases in temperature, the greater prevalence of large storms such as typhoons, and the El Nino effect and so on. The degree of coral cover on and around an atoll and its reef is a good indicator of the influence of global warming. To study this influence, we measured the degree of coral cover on the shore and reef areas of the three islands. On Pingelap and Mokil, ten sites were selected in the shallows facing the open sea, while on Pohnpei we worked along lagoon areas. During high tide, ten pictures were taken at each site from the sea surface. The degree of coral cover within each picture was measured in the laboratory and average values were calculated. All data (questionnaire and field observation) was statistically analyzed by one way ANOVA and Bonferroni test by SPSS (version 11).

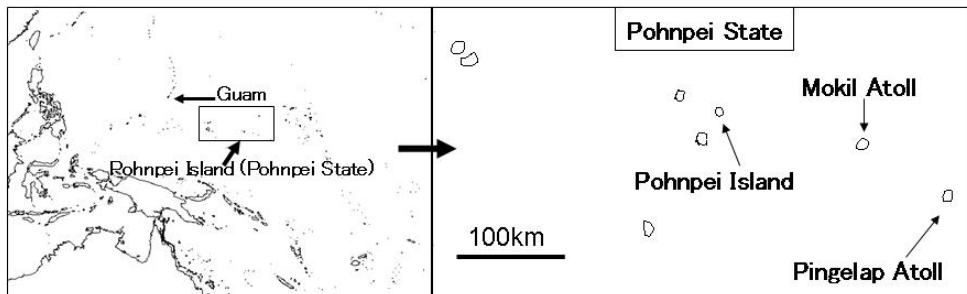


Fig. 2. A map showing the research area: Pohnpei Island, and Pingelap and Mokil Atolls, Federated States of Micronesia.

Results

Basic data about sample

The number of householders on each island who answered the questionnaire was between 30 and 50 people, and the average age of the respondents was between 40 and 50 years old (Fig. 3). All identified themselves as Christians. Men accounted for

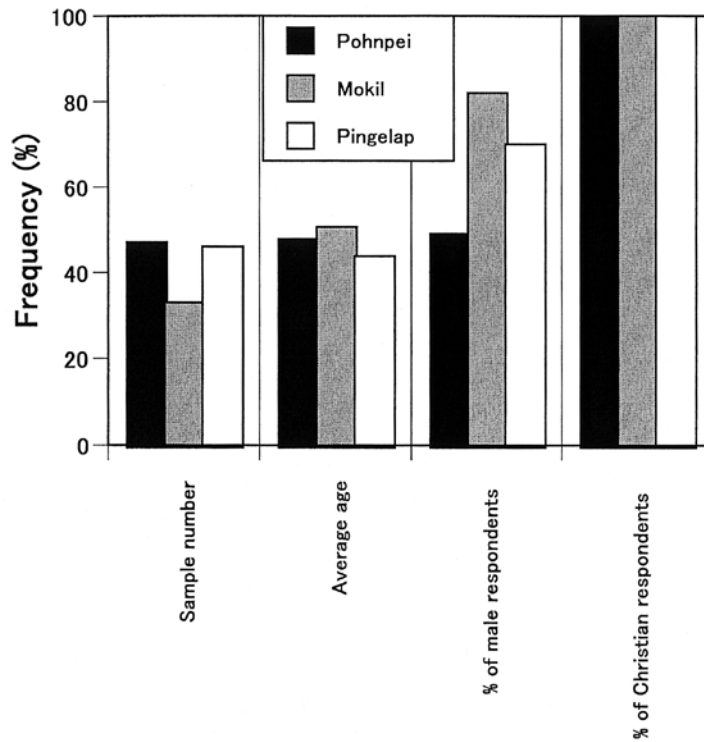


Fig. 3. Basic data from the household questionnaire used on Pohnpei, Pingelap, and Mokil: sample number, average age, percentage of male respondents, and the percentage of respondents who identified themselves as Christians in answering the questionnaire.

approximately 50% of the questionnaire respondents on Pohnpei; male participation in the questionnaire was higher for both Pingelap and Mokil.

Modern and traditional food

Figure 4 shows how many times in one week people on the three islands ate a traditional diet, identified here as swamp taro, taro, breadfruit, and fresh fish. As a result, the average daily consumption of swamp taro and fresh fish on Pohnpei which is closest to Guam was significantly lower than that on Mokil and Pingelap (One way ANOVA, $P < 0.05$). This seems to confirm that islands closer to an urban center (Guam) are becoming more globalized. However, the average daily consumption for taro and breadfruit was not significantly different among the three islands (One way ANOVA, $P > 0.05$.)

Figure 5 shows how many times in one week people on the three islands ate more modern food, identified here as rice, ramen, bread, canned meat, and canned fish. Average daily consumption of ramen (One way ANOVA, $P < 0.05$), bread (One way ANOVA, $P < 0.001$), and canned meat (One way ANOVA, $P < 0.001$) on Pohnpei were significantly higher than on Pingelap. This suggests that islands closer to an

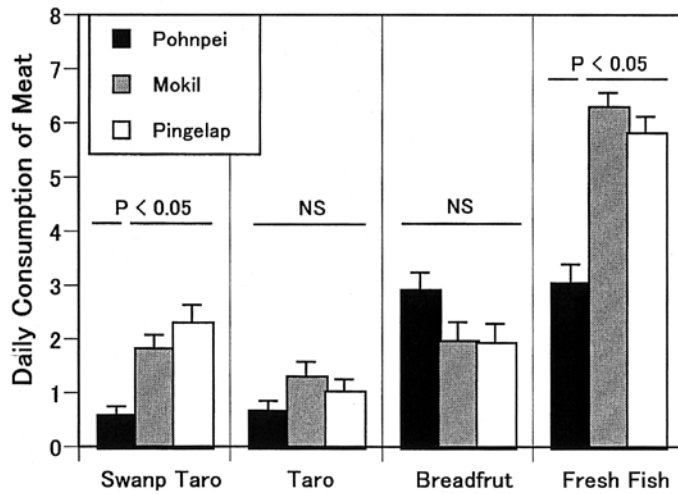


Fig. 4. Average weekly consumption of traditional food (swamp taro, taro, breadfruit, and fresh fish) on Pohnpei, Pingelap, and Mokil. Vertical bars at the top of columns show the standard error for such a sample. Ns: not significant difference.

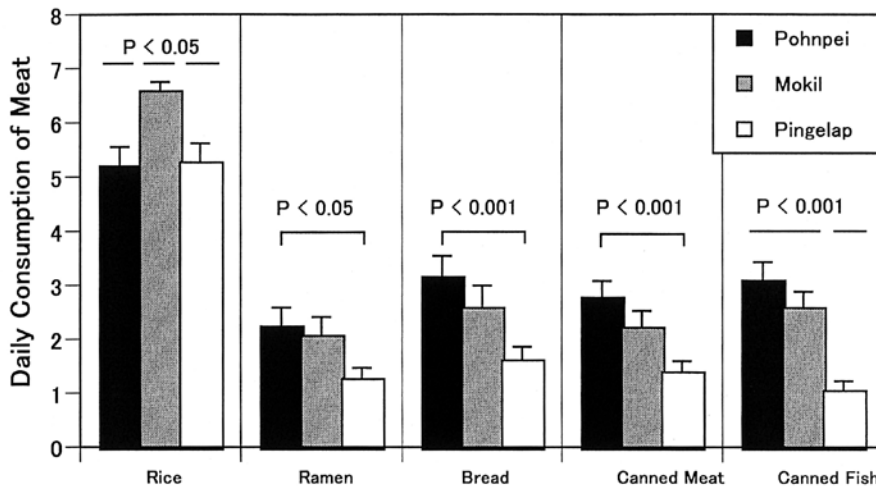


Fig. 5. Average weekly consumption of modern food (rice, ramen, bread, canned meat, and canned fish) on Pohnpei, Pingelap, and Mokil. Vertical bars at the top of columns bars the show standard error.

urban center are more globalized. Average consumption frequencies of canned fish on Pingelap and Pohnpei were significantly higher than that on Mokil (One way ANOVA, $P < 0.001$). This also suggests islands closer to an urban center are more globalized. However, consumption frequencies for rice on the three islands were relatively high compared with other modern food, and the frequency of rice consumption on Pingelap and Pohnpei was significantly lower than that on Mokil (One way ANOVA, $P < 0.05$).

This figure indicates that the respondents on the three islands consumed meat (frozen fish, beef, pork, and chicken) several times a week (Fig. 6). Average consumption frequencies of frozen fish and beef on Pohnpei were significantly higher than those on Pingelap and Mokil (One way ANOVA, $P < 0.001$). At the same time, the average daily consumption of pork and chicken on Pingelap was significantly lower than on Pohnpei and Mokil (One way ANOVA, $P < 0.05$). The data here again suggests that the closer the islands are to an urban center, the more globalized they become.

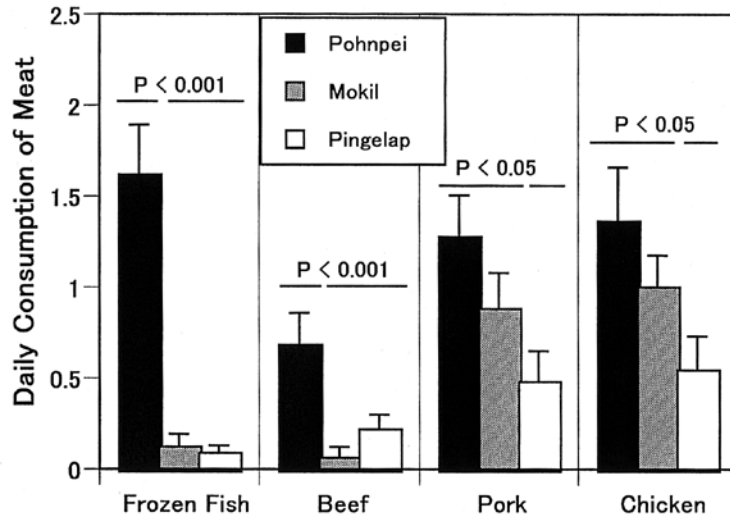


Fig. 6. Average weekly consumption of meat (frozen fish, beef, pork, and chicken) on Pohnpei, Pingelap, and Mokil. Vertical bars show the standard error.

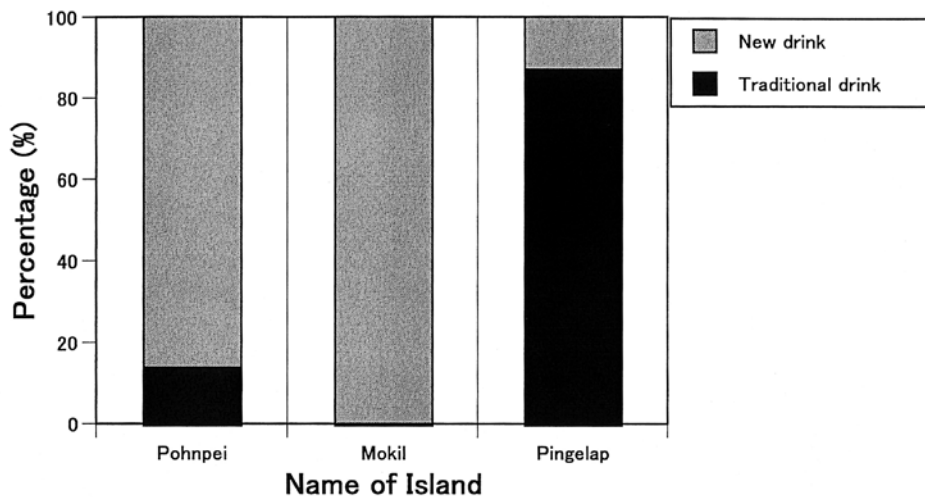


Fig. 7. Percentage of people on each island consuming either traditional or new drinks on Pohnpei, Pingelap, and Mokil. Traditional drinks include water and coconut juice. New drinks include store-bought beverages and mineral water.

Figure 7 shows the percentage of people on each island who were consuming traditional as opposed to modern drinks. The percentage of new or modern beverages being consumed on Pohnpei was high; conversely but not surprisingly, the percentage of traditional drink consumption on more distant Pingelap was also very high. Again, the evidence here seems to affirm the centre-periphery hypothesis that islands closer to the urban center are more globalized in their dietary patterns.

Electrical equipment and communication

Household possession of electrical equipment (refrigerators, radios, TVs, and DVDs) registered high on Pohnpei, and appears to be a feature of life that attracts people from the more remote islands (Fig. 8). Electronic communications equipment (mobile phones, newspapers, and the internet) was in use only on Pohnpei; access to electronic communications equipment paralleled the household possession figures for electrical equipment. To use this sophisticated equipment, state governments need to invest in plants and other related infrastructure; this is very expensive, especially for people on Mokil and Pingelap. On these two atolls, mail is still the dominant communication tool; on Pohnpei, reliance on mail as a medium of communication is low compared to the two atolls.

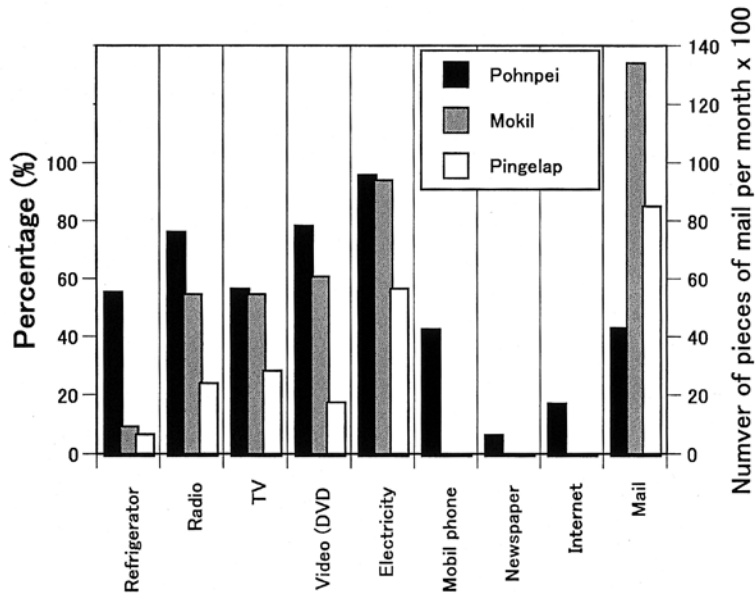


Fig. 8. Percentage of households possessing electrical equipment (refrigerator, radio, TV, and DVDs) on Pohnpei, Pingelap, and Mokil. The right bar shows the number of pieces of mail per month received on each island.

Coral cover in coastal area

The percentage of coral cover on Pohnpei was significantly higher than that on Mokil and Pingelap (One way ANOVA, $P < 0.001$) (Fig. 9).

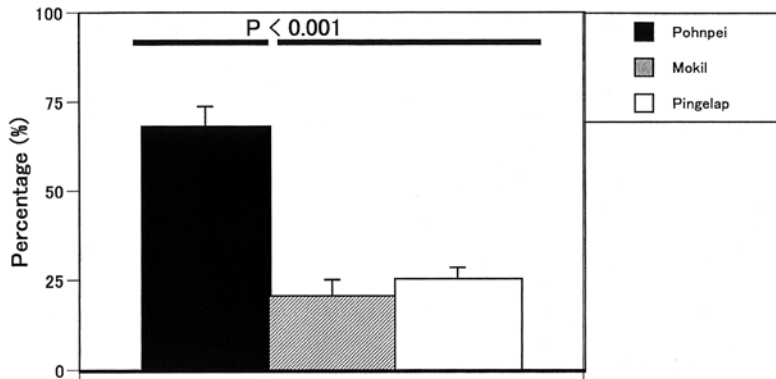


Fig. 9. Percentage of coral cover in studied areas on Pohnpei, Pingelap, and Mokil. Vertical bars at the top of columns bar shows the standard error.

Awareness of globalization and global warming

As indicated by the household questionnaire, people on the three islands worried very much about the influence of global warming on their communities. Concern about the increased frequency and amount of heavy rainfall was of significantly greater concern on Pohnpei than on Mokil and Pingelap where scarcity of fresh water is much more of a threat (One way ANOVA, $P < 0.05$) (Fig. 10). Worry about typhoons, sea winds, drought, and their effects on fishing and agricultural activities proved significantly lower on Mokil than on Pohnpei and Pingelap (One way ANOVA, $P < 0.05$).

The household survey revealed that people on all three islands worried a great deal about the influence of globalization on their lives. There were no significant differences among the three islands (Fig. 11).

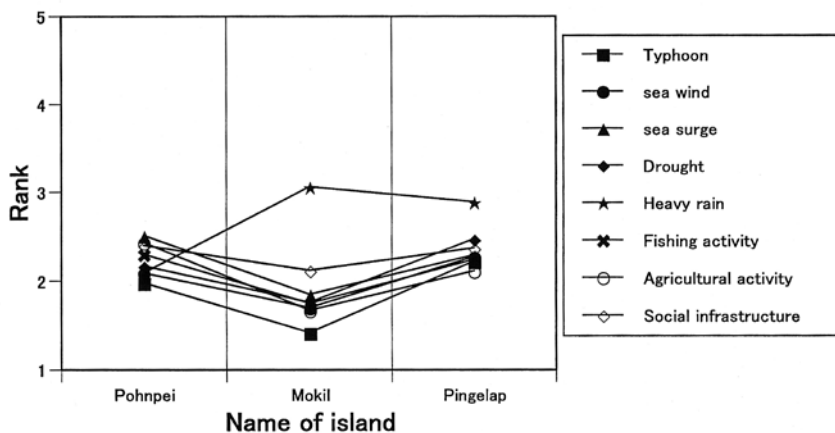


Fig.10. Average values in the awareness of increased typhoons, sea winds, sea surges, droughts, heavy rains, and of the effects of these climate changes on fishing and agricultural activities, and social infrastructure; 1: very very worried, 2: very worried, 3: worried, 4: not so worried, 5: not at all.

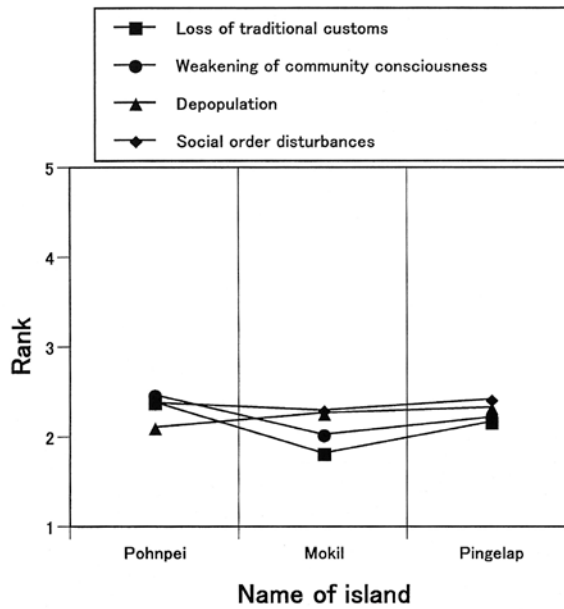


Fig.11. Average values in the concern for loss of traditional customs, the weakening of community consciousness, and disturbances to the social order related to globalization; 1: very very worried, 2: very worried, 3: worried, 4: not so worried, 5: not at all.

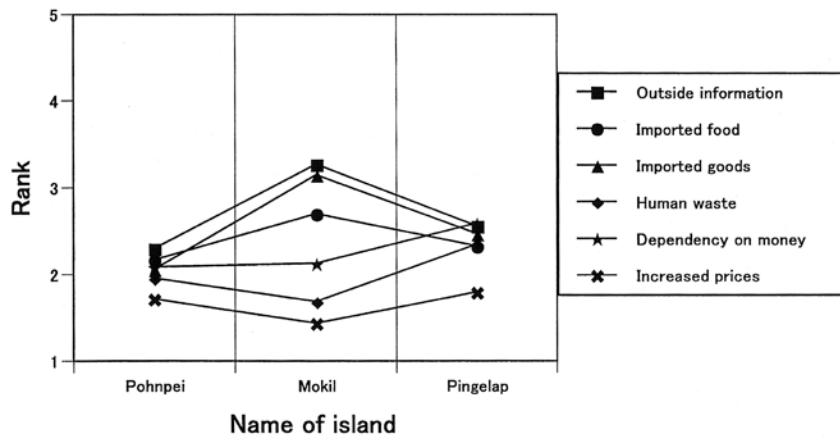


Fig.12. Average values in the consciousness of the effects of outside information, imported food, imported goods, human waste disposal, dependency on money, and increased prices on the local island community; 1: very very worried, 2: very worried, 3: worried, 4: not so worried, 5: not at all.

Our survey revealed that community awareness about the impact of globalization on the disposal of human waste was significantly higher on Pingelap than on Mokil (One way ANOVA, $P < 0.05$) (Fig. 12). The household survey also showed that people on Pohnpei and Pingelap worried more about the effects of outside information and imported goods on their islands than those on Mokil (One way ANOVA, $P < 0.05$).

Discussion

Hypothesis on global warming

Our investigation shows that there is a difference in the extent to which the coral cover on the three islands is affected by global warming. Thus, the hypothesis that the effects of global warming have similar intensity on island environments is not correct. To explain this finding, we offer two possible explanations.

First, weather phenomena resulting from global warming vary among islands and atolls; the impact of these varying weather phenomena on local environments also differ. El Nino and the increased frequency and intensity of typhoons are considered to be related to global warming. A study of El Nino in the Federated States of Micronesia from 1997 to 1998 found that its effects varied among the different islands and island groups (DREXLER & EWEL 2001). Typhoon "Sudal" hit Yap State in April 2004 and with devastating consequences for the local population and the natural environment. Generally the incidence and intensity of typhoons varies from area to area.

Secondly, the difference in the environmental factors affecting the growth of coral needs to be considered carefully. On Pingelap and Mokil atolls, our investigation focused on shallow areas facing the open the sea. On Pohnpei, we conducted our research around lagoon areas. In addition, environmental factors such as sunlight, temperature, and water depth vary from island to island, and thus have different effects on the growth of coral (e.g. GULKO 1998). Moreover, the effects of different environmental destruction and pollution may affect the growth of coral as well.

In this study, the degree of coral cover for each island was the only indicator used to test the hypothesis that global warming's effects are of similar kind and intensity on all islands. As global warming is affecting many aspects of the natural and social environments (IPCC 2007), this hypothesis must be further tested on the variety of activities taking place in these different environments. Therefore, more detailed research on this topic is desirable, even necessary.

Hypothesis on globalization

We did a field survey on the consumption of both traditional foods (such as swamp-taro, taro, breadfruit, fresh fish and coconut juice) and modern foods (such as rice, ramen, bread, canned meat and fish, frozen meat and fish, and soft drinks), and electrical equipment and communication. With regards to electrical equipment and communication, and foods other than rice, we found that the closer an island is to an urban center, the more the islanders consume modern foods, and the more they use or rely upon electrical equipment and communication. Conversely, the farther away an island is from an urban center, its inhabitants rely more on traditional foods and less on electrical equipment and communication. In general, our study validates the centre-periphery theory on the consumption of modern versus local or traditional food.

With regards to rice, however, the varying distances from Guam did not show any meaningful difference in consumption; rather it showed an equally high consumption

of rice among the three islands. Here, our research findings again challenge the centre-periphery hypothesis. There can be several reasons for the exception rice poses to the centre-periphery hypothesis. Unlike traditional foods such as taro and yam, rice can be easily stored for long periods of time. The cost of rice is also comparatively cheap. Thus, neither cost nor distance is an impediment to consumption on any of the three islands we studied. As a result, the consumption of rice has become widespread among all the islands despite the projections to the contrary advanced by the centre-periphery thesis.

Consciousness for environmental changes

Our survey shows that people on the three islands are deeply worried about the impact of environmental change on their island societies and natural environments. With regards to heavy rainfall, people on the islands of Mokil and Pingelap are not as worried as those on Pohnpei. Pohnpei Island has a lot of rain because of its high mountains (annual average about 1000cm: Lander and Khosrowpanah 2004), while there is less rainfall on Mokil (annual average about 380cm: personal data) and Pingelap because they are atolls. For this reason, people on the atolls are not worried about the damages caused by heavy rainfall; on the contrary, they desire more rain because of the difficulty in securing and maintaining adequate levels of drinking water on their islands. Thus, their need for drinking water removes any concerns about the negative consequences of increased heavy rainfall.

The results of our research also support the centre-periphery hypothesis in terms of general food consumption and the use of electrical and electronic forms of communication. Pohnpei shows urbanization under the influence of globalization, while Pingelap is less globalized and remains more traditional in terms of its social system. These circumstances affect the kinds of food they consume and the methods they use to communicate. In contrast to these poles of development, Mokil still partly maintains a traditional social system but locates itself in-between the other two islands by showing a great deal of global influence as well. However, as we noted above, our awareness survey on the effects of global warming and globalization shows a very different result than that posited by the centre-periphery thesis.

Pohnpei and Pingelap are stable with ongoing modernization for the former and with a continuing traditional social system for the latter, while Mokil Island is in a transitional phase from a traditional to modern social system. Thus, Mokil seems to be still partly maintaining a traditional social system while, at the same time, under the strong influence of globalization. That is, Mokil is located on the boundary between modernization and tradition which explains why the people there feel less secure (see the figures 10 and 12). Anthropologically, the case of Mokil is relevant to the boundary theory of Edmund Leach (LEACH 1976). According to Leach's theory, a people of peripheral area far from a center occupy a very ambiguous position in terms of cultural identity. This ambiguity causes uncertainty and insecure feelings among the people. Mokil's transitional position between center and periphery and also between

modernized and traditional social systems seems to put the island and the islanders in a unique situation that is not simply or easily explained by centre-periphery theory, but rather requires the help of boundary theory.

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Appendix

Questionnaire

General and Family

1. Gender (preference?) (1)male, (2)female, others (_____)
2. Age (_____ years old)
3. Which island (country) were you born? (_____)
4. Which island are you living now? (_____)
5. Which of the following is/are your main source/s of income now?
(1)Agriculture, (2)Fishing, (3)Salary, (4)Pension,
(5)Remittances, (6)Others (_____)
6. If you receive remittance/s from which island/s is/are they coming from?
Please indicate the sources from the largest to the smallest amount.
(1) _____ (2) _____
(3) _____
7. a. How many nuclear family members do you have now? (_____)
b. How many nuclear family members are living in another place? (_____)
8. a. How many nuclear family members are living in Pohnpei Island? (_____)
b. How many times do they come back/visit per year? (_____)
9. a. How many nuclear family members are living in a foreign
country/countries? (_____)
b. How many times do they come back/visit per year? (_____)
10. How many nuclear family members have graduated from high school? (_____)
11. How many nuclear family members are younger than high school age? (_____)
12. How many nuclear family members have graduated from college
(or have attained higher education)? (_____)
13. Please rate the field of education you think is more profitable
for your village young people to study?
Environmental science: (1)very important, (2)important, (3)not so important
Business and accounting: (1)very important, (2)important, (3)not so important
Information technology: (1)very important, (2)important, (3)not so important
Consumer protection and legal studies:
(1)very important, (2)important, (3)not so important
Political science: (1)very important, (2)important, (3)not so important

Meals and Drinking

1. How many meals do you eat per day?

(1)One, (2)Two, (3)Three, (4)More than three (_____ meals)

2. a. What kinds of food do you usually eat in every meal? (Multiple responses)

(1)Rice, (2)Swamp taro, (3)Taro, (4)Breadfruit,

(5)Packaged Ramen/noodles, (6)Bread, (7)Others (_____)

(_____)

b. How many times do you eat these foods (Choose from Q 2a) per week?

Do you buy these foods at stores, markets or from other people?

(Multiple answers)

	Times eating	Buying ○ or Not buying ×
1) Rice	()	()
2) Swamp taro	()	()
3) Taro	()	()
4) Breadfruit	()	()
5) Packaged Ramen	()	()
6) Bread	()	()
7) Others (_____)	()	()
Others (_____)	()	()
Others (_____)	()	()

3. a. What kind of side dishes do you take in addition to Q2? (Multiple answers)

(1)Fresh fish, (2)Frozen fish, (3)Beef, (4)Pork, (5)Poultry,

(6)Canned meat, (7)Canned fish,

(8)Others (_____)(_____)(_____)

b. What kind of side dishes do you eat per week in addition to Q2?

(Multiple answers). Do you buy this food from the stores, markets or from other people ?

	Times eating	Buying ○ or Not buying ×
1) Fresh fish	()	()
2) Frozen fish	()	()
3) Beef	()	()
4) Pork	()	()
5) Poultry	()	()
6) Canned meat	()	()
7) Canned fish	()	()
8) Others (_____)	()	()
Others (_____)	()	()
Others (_____)	()	()

4. What do you usually drink most? Please choose one from the following.

(1)mineral water (store-bought),

(2)beverages <drinks> except water (store-bought),

(3)water or drinks (not store-bought),

- (4)coconut juice
5. Do you use coconuts for drinking or cooking?
 - Drinking (1)Yes, (2)No
 - Eating or cooking (1)Yes, (2)No
 6. Do you drink coconut juice more or less than you had done 5 years ago?
 - (1)drunk more, (2)almost the same, (3)drunk less
 7. How often do you drink alcoholic beverages per week?
 - (1)almost everyday, (2)about twice or three times a week,
 - (3)about once a week, (4)drinking very little, (5)never drink
 8. When do you usually drink alcoholic beverages? Mark all that apply.
 - (1)on special occasions, (2)routinely,
 - (3)others (Describe in detail:_____)
 9. Which alcoholic beverage do you drink often? Mark all that apply.
 - (1)beer, (2)wine, (3)whisky, (4)palm wine <toddy>
 - (5)others (Describe in detail:_____)
 10. Do you drink alcoholic beverages more or less than you had done 5 years ago?
 - (1)more, (2)almost the same, (3)less
 11. Do you have a refrigerator in your house?
 - (1)Yes, (2)No

Life style

1. Do you have a religion or belong to a church?
 - (1)Catholic church
 - (2)Protestant denomination
(name of the church:_____),
 - (3)I follow traditional customs of my island,
 - (4)others (please describe:_____),
 - (5)I have no religion
2. How often do you go to your family (or ancestral) graveyard?
 - (1)more than twice a week, (2)about once a week,
 - (3)several times a month, (4)several times a year, (5)never
3. (For Christians) How often do you go to church?
 - (1)more than twice a week, (2)about once a week,
 - (3)several times a month, (4)several times a year, (5)never
4. How many times have you been abroad <to foreign countries>? (_____ times)
(A question to people who have gone abroad) Which places have you been?
 - 1) Pacific Island countries or regions except for Micronesia
(Please specify :_____)
 - 2) Asian countries (please specify :_____)
 - 3) American countries (please specify:_____)
 - 4) European countries (please specify:_____)
 - 5) Other regions (please specify :_____)

5. How many time have you visited at Colonia this year? (_____)
6. What kinds of crops do you plant or cultivate? (Multiple answers)
 - (1)Swamp taro, (2)Upland Taro, (3)Yam, (4)Sweet potato, (5)Tapioca (Cassava),
 - (6)Breadfruit, (7)Others (_____) (_____) (_____),
 - (8)I don't cultivate any crops
7. What kind of vegetables do you plant or cultivate? (Multiple answers)
 - (1)Tomato, (2)Eggplant, (3)Sweet pepper, (4)Onion,
 - (5)Cabbage, (6)Other leaf vegetables, (7)Pumpkin,
 - (8)Cooking banana, (9)Others (_____) (_____) (_____) (_____)
 - (10)I don't how to grow any vegetables
8. What kind of fruits do you plant or cultivate? (Multiple answers)
 - (1)Citrus, (2)Banana, (3)Mango, (4)Guava,
 - (5)Others (_____) (_____) (_____) (_____),
 - (6)I don't grow any fruits
9. a. Do you have a radio?
 - (1)Yes, (2)No
 - b.(I YES to Q9.a) How many hours do you listen per day? (_____)
10. a. Do you have a TV set?
 - (1)Yes, (2)No
 - b.(If YES in Q 10.a) How many hours do you watch per day? (_____)
11. a. Do you have any kind of video player (include DVD)?
 - (1)Yes, (2)No
 - b. (If YES to Q11.a) How many hours do you watch per day? (_____)
12. Do you have mobile phone?
 - (1)Yes, (2)No
13. a. Which type of electricity do you have in your house?
 - (1)public electricity, (2)generator, (3)no electricity
 - b. If you have generator, when did you buy it? (_____)
 - c. How many hours do you use the generator? (_____)
14. Do you buy a newspaper everyday?
 - (1)Yes, (2)No
15. How many pieces of mail and parcels do you receive a month? (_____)
16. Do you frequently use the internet?
 - (1)Yes, (2)No

Anxiety in life

Do you worry about changing climate? Please answer by degrees.

1. Typhoon:
 - (1)Very very worried, (2)Very worried, (3)Worried,
 - (4)Not so worried, (5)Not at all
2. Sea wind:
 - (1)Very very worried, (2)Very worried, (3)Worried,
 - (4)Not so worried, (5)Not at all

3. Sea surge: (1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
4. Drought: (1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
5. Heavy rain: (1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
6. Fishing activity (e.g. decrease in the number of catch, because of coral
bleaching)
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
7. Agricultural activity (e.g. decrease productivity, because of strong wind
and wave): (1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
8. Social infrastructure and traffic problem (e.g. broken road and bridges
and other infrastructures because of strong wind and wave)
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all

How much anxiety do you feel regarding the following issues? Please answer by degrees.

1. Too much outside information
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
2. Too much imported food
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
3. Too many imported goods
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
4. Too much human waste
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
5. Dependency on money
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
6. Increasing prices
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
7. Loss of traditional customs
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all
8. Weakening of community consciousness
(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all

9. Depopulation

(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all

10. Social order disturbances and generational change

(1)Very very worried, (2)Very worried, (3)Worried,
(4)Not so worried, (5)Not at all

