

Social Carrying Capacity for Sustainable Island Tourism : The Case of Okinawa

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Key words: Island sustainable tourism, Okinawa, comparative advantage, social carrying capacity, Net Present Value (NPV) Approach, Contingent Valuation Method (CVM), SWOT analysis, sustainable indicators, water shortage, cultural friction, nonrenewable resources

1. The Roles of Tourism for Small Island Economies

Tourism as an engine of growth

According to the World Tourism Organization (WTO, 1995), about 700 million people traveled abroad in 2000, generating an estimated tourists’ expenditure of \$400 billion in 2002. WTO’s “Tourism 2020 Vision” forecasts that globally the number of tourists will rise to more than 1.56 billion by 2020. While Europe currently accounts for about 60% of all tourists, the East Asian region is expected to witness the most dynamic growth in the coming years (FIGURE 1).

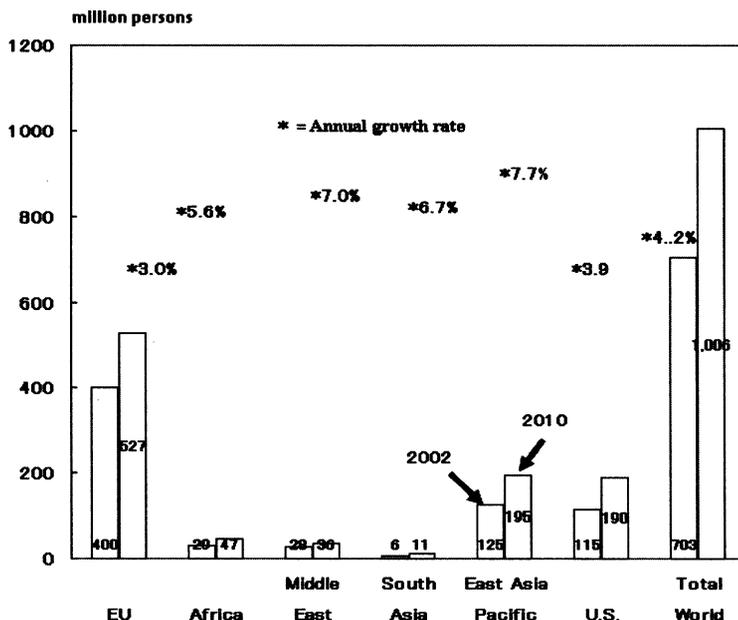


FIGURE 1. Number of Tourist Arrivals and Annual Growth Rates by Region: 2002-2010.

Source: World Tourism Organization (2005).

For small island economies, the tourism or visitors' industry has been the fastest growing and most important industry accounting for 20-70% of their current external receipts. Small islands, in particular, transformed rapidly into tourism dependent economies because (1) they lack natural resources to exploit for export earnings; (2) their market sizes are too small to develop a viable manufacturing industry; (3) tourism-related industries are usually small-scale and labor-intensive; (4) they are endowed with marine resources, particularly beautiful beaches; (5) these islands are part of or surrounded by richer countries such as the United States and Japan with well-organized transportation networks; (6) their tropical or semi-tropical climatic and cultural conditions are complementary with those rich countries; and finally these island communities have maintained internal political stability and offer warm hospitality to visitors (see Kakazu, 1996; 2002).

Tourism as a composite industry

Tourism is usually classified as a "service" industry. As such tourists' expenditures are recorded as "service receipts" in the balance of payments statistics. Tourists' expenditures, however, are, quite different from other external "service receipts" such as sales of transportation, insurance, intellectual property rights and labor. Apart from lodging, a large portion of tourists' expenditures are in the form of local consumption and purchases of

local or imported products and services such as souvenirs, meals, transportation and various entertainments. Therefore, “sales to tourists” are directly reflected in local production or imports of goods including agriculture and manufacturing.

For small island economies in particular, tourism needs to be conceptualized as a composite industry, not merely a service industry. Such a re-conceptualization of the tourism industry in small island economies will provide a development framework to diversify and revitalize diminishing local agriculture and manufacturing as well as conserving tourism resources including marine and historical and cultural assets (see Kakazu, 1998). In Okinawa, for example, aside from conventional tourism industry such as hotel, travel agents, transportation, souvenirs and travel guides, the industry is deeply and extensively related to local cultures, production sectors, information and communication technology (ICT), various entertainments and sports, transportation, marketing and promotional activities, conventions and preservation of natural and cultural assets (FIGURE 2).

TABLE 1. Okinawa’s Tourists’ Expenditures by Category: 2005

	(¥ 100 million)	(%)
Total Expenditure	3,984	100%
Lodging	1,347	33.8
Souvenirs	1,028	25.8
Meals	725	18.2
Transportation	446	11.2
Entertainment	335	8.4
Others	104	2.6

↓

Impacts on		
Production	6,991	¥ 100million
Value-added	3,797	¥ 100million
Employment	7	10,000
Taxes	11	¥ 100million

Source: Okinawa Prefecture.

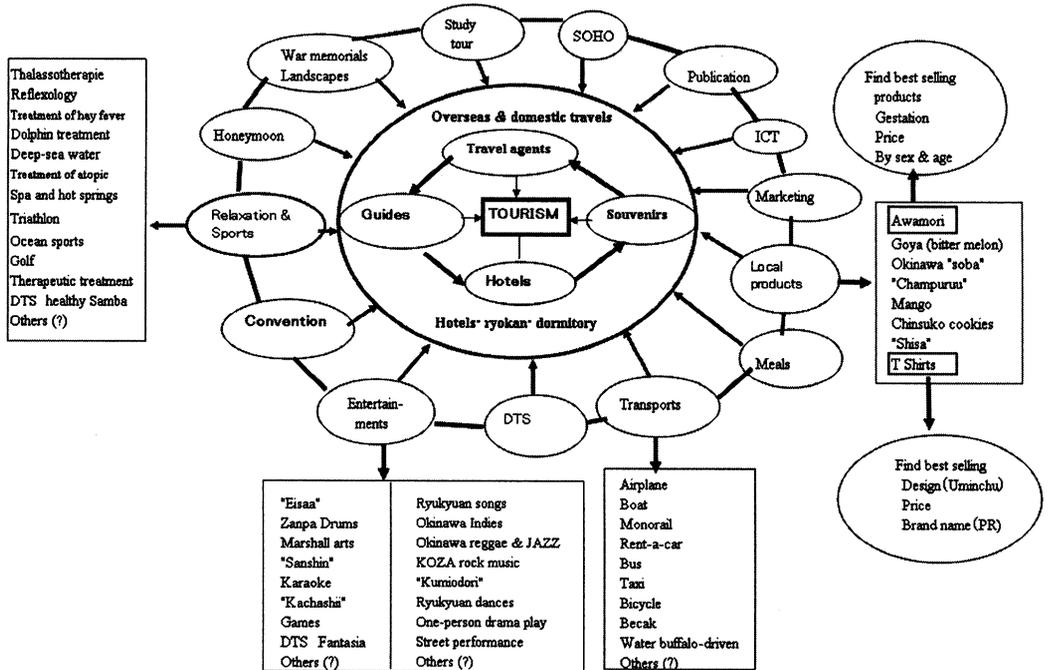


FIGURE 2. Main Tourism-related Industrial Activities.

Note: DTS=Department of Tourism Science, University of the Ryukyus.

Source: Kakazu, H. (2007).

In this sense, tourism and goods producing sectors (agriculture and manufacturing) are supposed to be complementary each other and not necessarily a trade-off as many economists have asserted in their development theories (see Kakazu, 1994). The case of Okinawa demonstrates that one unit of tourist's expenditure actually generated about 1.5 units of gross income of domestic production. This multiplier effect is actually higher than Aomori and Shizuoka prefectures which are located in the heartland of Japan (TABLE 2) (see Ministry of Land, Infrastructure and Transport, 2006).

This suggests that tourism can be considered as a powerful engine for industrial diversification for small island economies where the domestic market is extremely limited by their small size of population and small, fragmented markets. Tourists provide additional markets for local goods and services. Of course, leakages of tourists' expenditures through imports of goods and services, which accounted for 40% of the expenditures, need to be minimized to improve the economic impact of the tourism industry. More local-made, high value-added consumption, souvenirs, attractive entertainments, refined hospitality and needs-oriented infrastructures including transportation and information systems are measures to be taken by policy makers as well as industry leaders.

TABLE 2. Comparison of Economic Impacts of Tourism Expenditures
for Selected Regional Economies

	Unit	Okinawa (2004)	Hokkaido (1999)	Aomori (2004)	Tokyo (2004)	Shizuoka (2002)	Kyoto (2004)
Tourists' expenditure	¥ 100 mil.	4,549	12,163	1,759	34,870	7,723	5,348
Gross income	¥ 100 mil.	6,903	18,773	2,342	75,750	9,673	10,103
Net income (vale-added)	¥ 100 mil.	3,794	NA	1,331	NA	5,189	4,336
Gross regional product (GRP)	¥ 100 mil.	35,001	196,356	42,515	818,429	157,543	57,962
Net income/GRP	%	10.8	NA	3.1	NA	3.3	7.5

Note: NA=Not Available.

Source: OPG, *Outline on Okinawa's Tourism*.

Tourism as an export industry

As previously mentioned, tourists' expenditures are recorded as "service receipts" in the external balance of payments statistics. Tourism incomes, in effect, are equivalent to "exports" of not only services but also goods which are sold to non-resident tourists. Conceptually, the only difference between income from export trade and tourism incomes are where the goods and services are traded and consumed. Tourists' receipts imply precisely the same effect as exports of goods and services.

Factors to determine the comparative advantage of the tourism industry differs greatly from that of the goods producing industries such as agriculture and manufacturing. According to modern trade theory, comparative advantages in goods industries are determined by relative costs or productivity of trading partners. Comparative advantage in 'tourism products', however, is determined by both economic and non-economic factors such as geographical location, culture, history and even by 'hospitality spirits' which are difficult to capture in rational economic terms.

But we should note that the tourism industry also faces more or less the same kind of competition, and displays similar characteristics to the goods producing industry. The CNMI (Saipan), Guam, and Okinawa, in particular, have been competing with each other for the growing Japanese tourism market. In the past, Okinawa suffered cost disadvantages against these tourist destinations because of the rapid appreciation of the yen. The CNMI also has a labor cost advantage over Okinawa because it has been able to import cheap labor primarily from the Philippines (Kakazu, 1994).

Tourists' income accounted for about 10% and 18% of Okinawa's gross prefectural income and total external receipts respectively in recent years (FIGURE 3). Unlike Japan proper, Okinawa has recorded a huge surplus in tourism balance of payments. Although

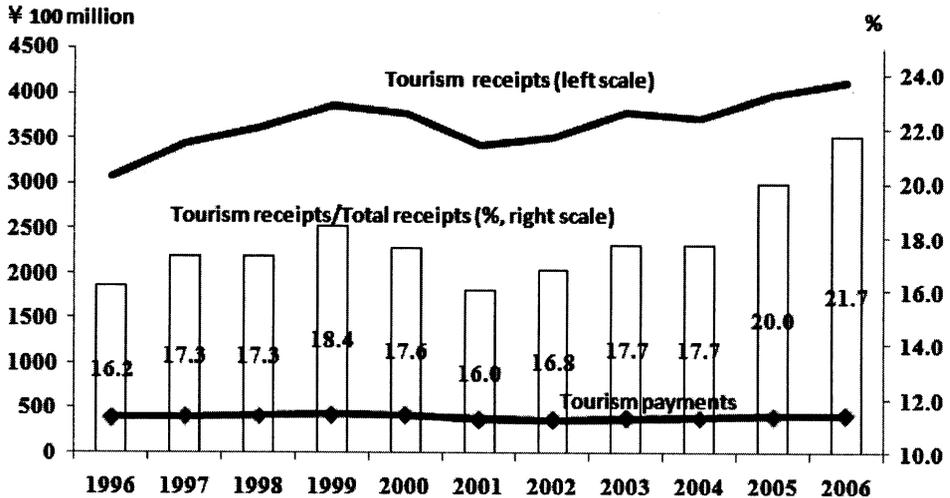


FIGURE 3. Tourism in Okinawa's Balance of Payments: 2000-2006.

Notes: Except for tourism receipts, figures for 2005-2006 are estimated by this author. All figures are in current prices.

Source: See Table 2.

external receipts from tourists jumped about 12-fold since Okinawa's reversion, to \$3.6 billion in 2006, the amount is only one-third of that of Hawaii. As we discuss in the later part of this chapter, Okinawa's per capita tourist expenditure has declined in recent years.

Although Okinawa has been struggling to diversify its tourism markets in order to reduce instability in the tourism industry as well as to capture the emerging East Asian market, it is not succeeding. One important bottleneck for the diversification is the lack of networks in terms of transportation, hotels and promotional activities between Okinawa and other Asian countries. The tourism industry in Okinawa is so meticulously tailored toward mainland Japan that it will require tremendous effort to diversify elsewhere.

Tourism as a "cultural catalyst" and friction

An important difference between commodity exports and service exports through tourism activities is that the former are consumed or stocked in the imported region, while the latter are inseparable from the exporting region where the services are rendered. In this sense, tourism is considered to be a package of economic as well as non-economic

factors. In any country, tourists are mostly welcomed not only because of the income and employment they generate, but also because they are regarded as “cultural catalysts” (Kakazu, 1997).

Despite a welcome attitude toward tourists, however, there are always deep-rooted fears among the island people that their fragile environments and rich culture might be eroded or degraded by a massive and continuous intrusion of outsiders. There are also constant complaints on the part of island economies that major tourism businesses, including hotel facilities and airline transportation, are dominated by mainlanders and that the majority of tourism-generated revenue is boomeranged back to the mainland. Similarly, many small islands’ tourism industry over-expanded through imported foreign labor has been creating various socio-economic problems and uncertainty for the life of islanders including water shortages, food insecurity, imported inflation and family problems (Kakazu, 1994). Therefore, it is an urgent task for tourism dependent island economies to determine the “carrying capacity” of tourists’ absorption for sustainable development which will be discussed later.

Tourism as a Peace Industry

Tourism is well-recognized as a peace industry. No country or region has ever adopted a policy to reject genuine tourists unless they are hostile or detrimental to host countries. As we have witnessed in recent years, tourists are most sensitive to their own security. Recent terrorists’ attacks on NYC (September 11, 2001) and Bali (October 2002), the outbreak of SARS, avian flu and tsunami disaster all scared off potential visitors in the Asia-Pacific.

FIGURE 4 clearly demonstrates that the number of Japanese tourists to Bali noticeably declined after terrorists’ bomb attack on October 12, 2002 in the tourist resort of Kuta which killed 202 people, largely foreign tourists. The effects of the incident were immediate, rendering arrivals for the year declined sharply from the previous year. Further bombings occurred on October 1, 2005.

Japanese tourists are considered to be particularly sensitive to such incidents. Therefore the bottom line for sustainable tourism is to secure “peace and stability” in tourist destinations. In this context, island tourism policy makers are requested to learn “risk management,” namely how to assess political as well as unexpected risks arising from travel. Of course, insurance is one of the means to reduce such risks. Tourism risk management is particularly important.

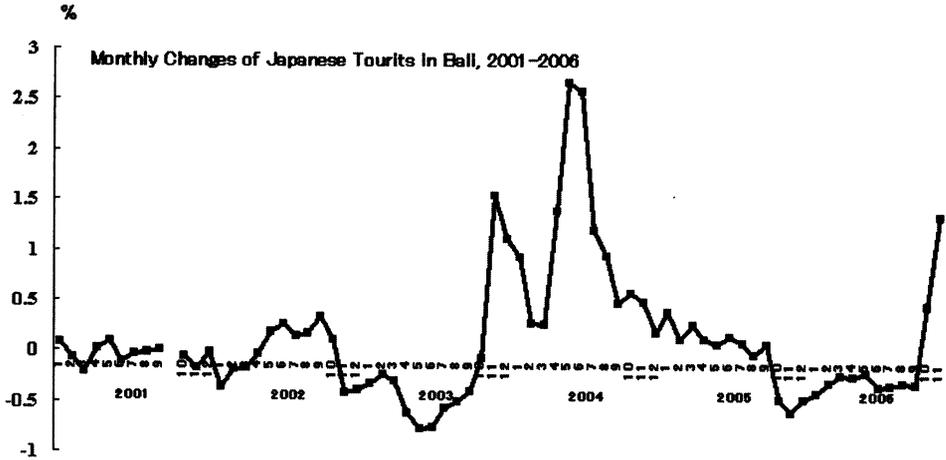


FIGURE 4. Risk of Island Tourism: The Case of Bali.

Source: Compiled from the Japan National Tourist Organization (JNTO) data on Japanese Overseas Travelers.

2. Issues and Prospects for Okinawa's Tourism Industry

Issues of Tourism as a Key Industry

Tourism has been a main engine for Okinawa's economic growth since reversion (see Appendix B for recent statistics on tourism). The industry continues to be the most powerful engine for future development because it possesses the archipelago's potential comparative advantage. The tourism industry, however, faces challenging problems to be resolved. First, despite the rapid growth of tourists in the past decade, tourism expenditures have not grown in commensurate with the number of visitors. As a matter of fact, tourism incomes declined during 2000-2005 despite the number of visitors increased by 630,000 persons (FIGURE 5A). The decline is also reflected in a sizable decrease in per capita tourism spending from ¥84,000 to ¥70,000 (FIGURE 5B).

Alternatively, a ¥10,000 decrease in per capita spending means a loss of 450,000 visitors in terms of total tourism income. This clearly suggests that the tourism industry, which consumes local resources, should not be a mere "number game". Okinawa is facing the problem of how to up grade its tourism industry. The same problem is also shown in terms of tourists' incomes as a percentage of GDP and external receipts which have kept almost constant for more than the past decade despite the number of visitors have risen by 1.6 times (FIGURE 5C). Okinawa's per capita tourist spending is about one-half of Hawaii's reflecting the length of stay and quality of services (see APPENDIX FIGURE 1).

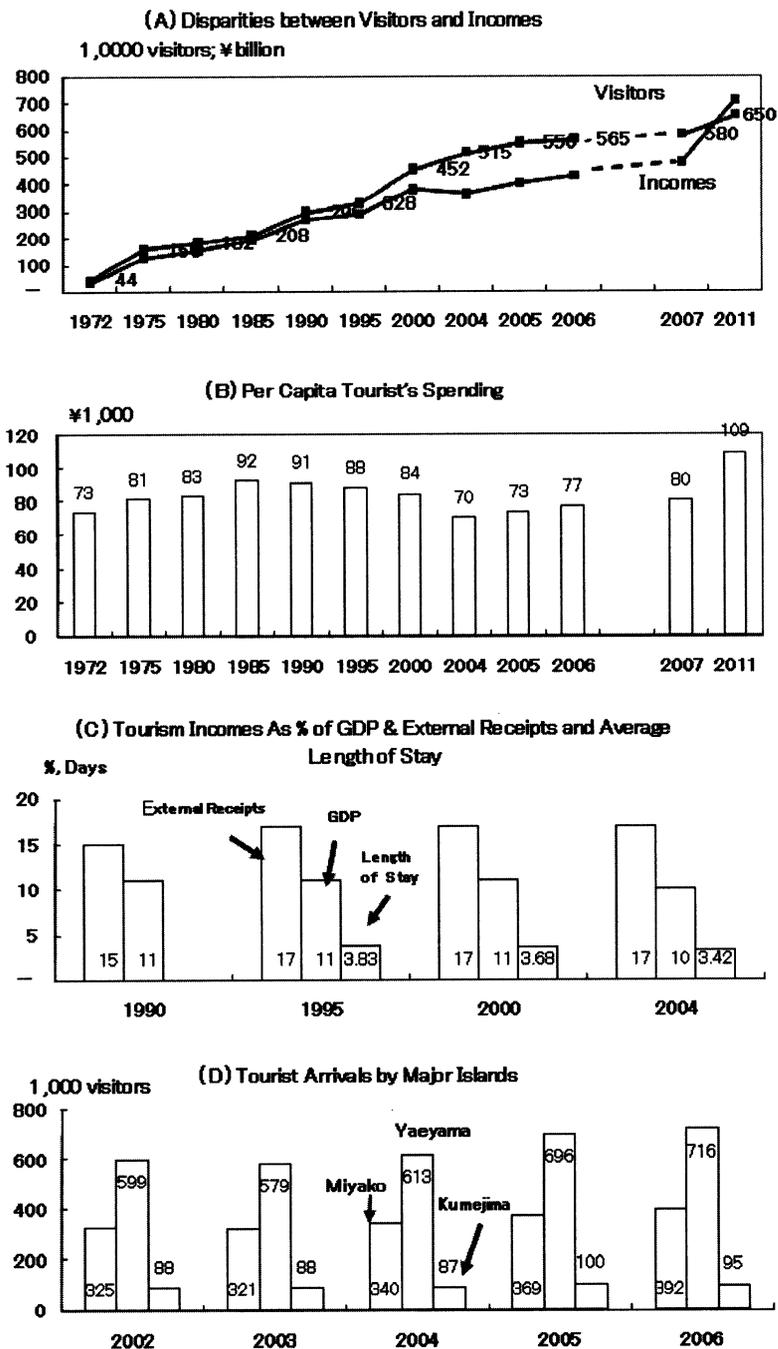


FIGURE 5. Okinawa's Tourism Industry and Issues: 1972-2011.

Notes: Figures for 1972-2005 are actual, figures for 2006-2011 are estimated or projected by the OPG.

Source: Compiled from the *Okinawa Statistical Yearbook*, various issues.

Deepening the structure of tourism is the most effective measure that can be taken to address the recent declining trend of per capita tourism consumption. “Cheap, Near, and Short” has been a recent slogan to attract mainland tourists to Okinawa. As a result, despite high hotel-room occupancy rates, per-room revenue has actually declined substantially. Such excessive competition by means of price-cutting may eventually damage tourism in Okinawa. Okinawa needs to shift its paradigm from “quantity-oriented tourism policy” to “quality-oriented one.”

Second, tourism is becoming more important in smaller islands where comparative advantage lies in the location of specific indigenous endowments including marine resources, local culture and hospitality. As we have seen, Ishigaki and Miyako islands are becoming Japan’s prime resort islands. We should note, however, that economic benefits such as incomes and employment arising from tourism differ greatly from island to island. The number of visitors to Kumejima Island, for example, has stagnated in recent years compared to the more popular Ishigaki and Miyako islands (FIGURE 5D). It is a daunting task to spread tourism benefits among islands and regions as well as to upgrade tourism quality so that per capita tourism spending will increase.

Third, Okinawa’s tourism heavily depends on mainland tourists. More than 95% of tourists are mainlanders. The Tokyo, Kansai and Fukuoka areas account for nearly 80% of the total tourists. Okinawa should learn a lesson from the bitter experience of Miyazaki where tourism boomed once and burst soon after. As we have noted already, although Okinawa may continue as one of the favorite resorts in Japan for the foreseeable future, this assessment depends largely on Okinawa’s future comparative advantages in environmental quality, rich cultural heritage and hospitality which support the tourism industry. For Okinawa, this is a good time to realize and take necessary actions to diversify its customers. Fortunately, Okinawa is located between rich mainland Japan and emerging regions such as China, Korea and Southeast Asia. There is no reason why Okinawa should not take advantage of these prospective, dynamic customers. What we need are more promotional campaigns for Okinawa’s niche tourism in these areas.

Fourth, the future growth of Okinawa’s tourism industry will be constrained by its limited carrying capacity which will be fully discussed in the following section. In particular, the limited supply of quality water and environmental degradation are the most important constraints. Although the OPG has planned to achieve 6.5 million tourists by 2011 and 10 million by 2017, there is no convincing data to support at all whether this target is consistent with Okinawa’s carrying capacity or not.

Finally, what is crucial in enhancing tourism activities is the availability of a highly

flexible, skilled labor force. As we have noted, Okinawa has been experiencing a growing mismatch in the labor market arising from a rapid transformation in economic structure and lagging human resource development. Despite the rising unemployment rate, which is not only an indicator of an unutilized labor force, but also an indicator of multiple deprivations such as social exclusion, loss of self-reliance, self-confidence and psychological and physical health, many resort hotels are having a difficult time finding qualified managers. This widening mismatch can be addressed by improved human resource development in targeted economic activities, namely tourism-centered and information-based activities. The University of the Ryukyus, nationally-incorporated institution established the Faculty of Tourism and Industrial Management (FTIM) in 2007 to meet the growing demand for professional human resources in the tourism industry.

Prospects

Despite the number of issues, tourism is Okinawa's most important and potential industry in the future. TABLE 3 shows the latest (as of November 2005) experts' rankings of Japan's resort destinations in terms of "attractiveness" and "future prospects." The resort ranking survey was conducted by the *Japan Economic Journal* group based on assessments of resort experts (researchers, consultants and resort businessmen and women) who visited 49 pre-selected resort areas over the past five years. "Attractiveness" was measured with the scores of 1-7 points and "future prospects" for the coming decade was assessed within the range of minus 2 and plus 2 with the current status as the zero benchmark. In terms of "attractiveness," Karuizawa topped the list followed by Okinawa's Ishigaki and Kohama islands.

In terms of "future prospects." Okinawa captured the top two rankings which will clearly demonstrate Okinawa's sustainable comparative advantage as a tourist destination. The survey has also pointed out that the enhanced hospitality to the elderly and Asian tourists are key to succeed in the future prospects.

TABLE 3. Experts' Evaluations on Japan's Domestic Resort Destinations: 2005

Rankings		Resorts	Prefectures	Ranking Scores	
Attractiveness	Future Prospects			Attractiveness	Future Prospects
1	2	Karuizawa	Nagano	5.9	0.9
2	1	Ishigaki/Kohama Islands	Okinawa	5.7	1.4
3	2	Onna, Busena, Yomitan	Okinawa	5.6	0.9
4	4	Okuma, Motobu, Karucha	Okinawa	5.5	0.8
5	4	Kusatsu	Gunma	5.4	0.8
5	4	Miyako Island	Okinawa	5.4	0.8
7	4	Niseko	Hokkaido	5.3	0.8
7	9	Hakone	Kanagawa	5.3	0.5
9	19	Urabandai, Bandai Heights	Fukushima	5.0	0.1
9	11	Nasu Heights	Tochigi	5.0	0.3
9	8	Yufuin	Oita	5.0	0.6
12	15	Furano	Hokkaido	4.8	0.2
12	11	Omuma	Hokkaido	4.8	0.3
12	27	North Karuizawa	Gunma	4.8	-0.2
12	9	Yatsugadake South Highland	Yamanashi	4.8	0.5
12	19	Tateshina, Shirakaba Lake	Nagano	4.8	0.1
17	46	Kiroro	Hokkaido	4.7	-0.7
17	24	Rusutsu	Hokkaido	4.7	-0.1
17	11	Izu Heights	Sizuoka	4.7	0.3
20	24	Nikko, Kirifuri Heights	Tochigi	4.6	-0.1
20	24	Shiga Heights	Nagano	4.6	-0.1

Notes: See text for the survey method.
Source: *Japan Economic Journal* No.7, 2005, P.12.

Another survey by JTB also indicates that Okinawa is number one island destinations for the coming years followed by Hawaii, Bali Guam/Saipan, New Caledonia and others (FIGURE 6).

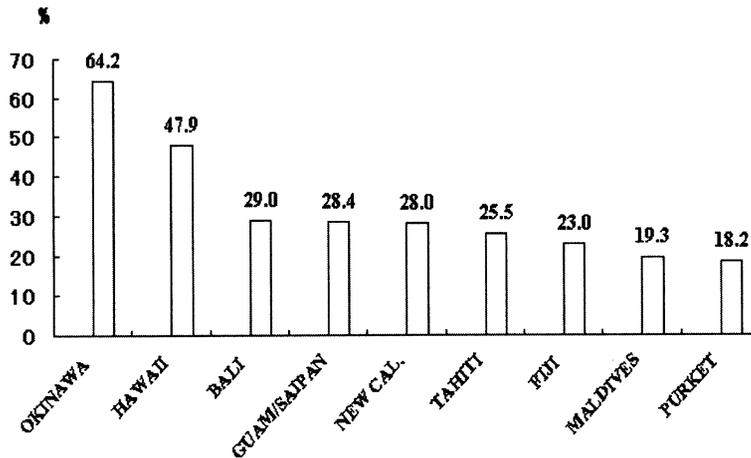


FIGURE 6. Most Favored Island Tourists' Destinations: 2005.

Source: JTB's Travel Intention Survey (2005).

3. Concept and Approaches to Sustainable Tourism Development

Concept of Sustainable Tourism

The concept of "sustainable development" was first used by the Brundtland Report in *Our Common Future* (1987) as follows:

".....a process of change in which the exploitation of resources, the direction of investment, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspiration" (Brundtland, p.5).

The concept is illustrated in 7 (see Kakazu, 2007 for an in-depth analysis).

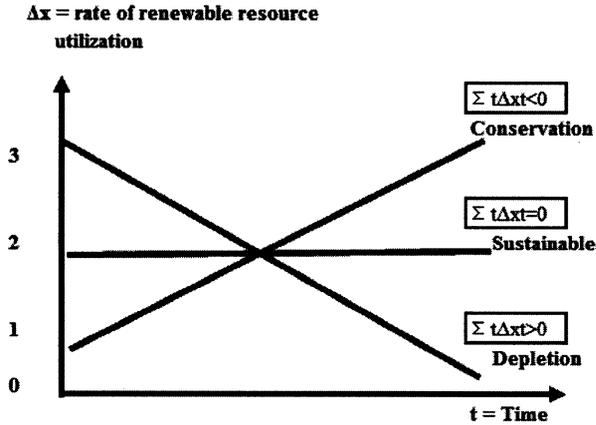


FIGURE 7. A Concept of Sustainable Tourism.

Source: Kakazu. H. (1994).

Assume (t) is the passage of time and (Δx) is the rate of tourism resource use. As such, then “sustainable tourism development (STD)” can be defined as $\sum t \Delta x t = 0$, while unsustainable resource use (depletion) and over-conservation can be defined as

$\sum t \Delta x t > 0$ and $\sum t \Delta x t < 0$, respectively.

According to the World Tourism Organization (WTO), STD meets the needs of present tourists and host regions while protecting and enhancing opportunity for the future. It is envisaged as leading to management of all resources in such a way that economic, social, and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity, and life support systems. We must also add that STD should meet the needs and wants of the local host community in terms of improved living standards and quality of life (QOL). The concept should also satisfy the demands of tourists and the tourism industry, and continue to attract them in order to meet the first aim; and, safeguard the environmental resource base for tourism. Therefore, “sustainable tourism in its purest sense, is an industry which attempts to make a low impact on the environment and local culture, while helping to generate income, employment, and the conservation of local ecosystems. It is responsible tourism which is both ecologically and culturally sensitive.” (Association for Tourism and Leisure Education, 2007).

Sustainable Indicators and Constraints

FIGURE 9 shows the trends of Okinawa’s water and electricity consumption as the de facto population (including the number of tourists and U.S. military personal) rises in the future.

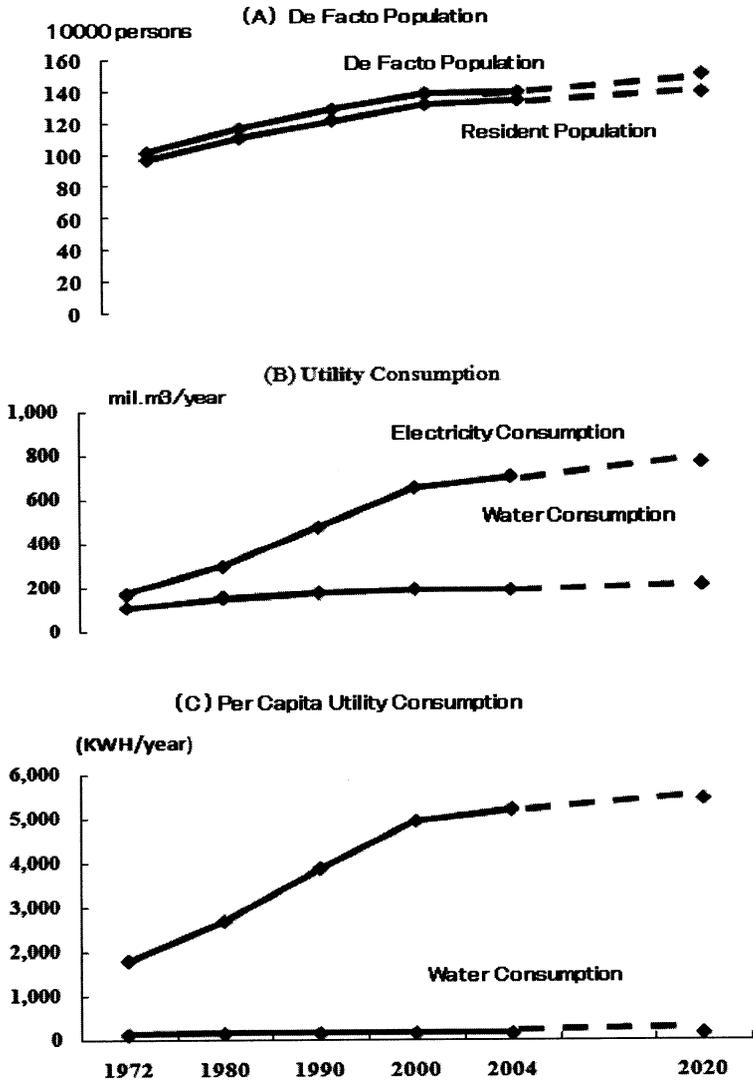


FIGURE 8. Okinawa’s Main Sustainable Indicators: 1972-2020.

Notes: De Facto Population=Resident Population+Non-resident Population

Figures for 2020 were estimated by this author.

Water and electricity consumptions include all Okinawa islands.

Sources: Compiled from the *Okinawa Statistical Yearbook*, various issues.

There are also possible supply constraints with public utilities such as water and electricity which have increased by more than Okinawa's economic growth rate since reversion. Although a severe water shortage has not occurred in recent years, the water supply is precariously dependent on rainwater (FIGURE 9 and see more details in Chapter 5 of Kakazu, 1994).

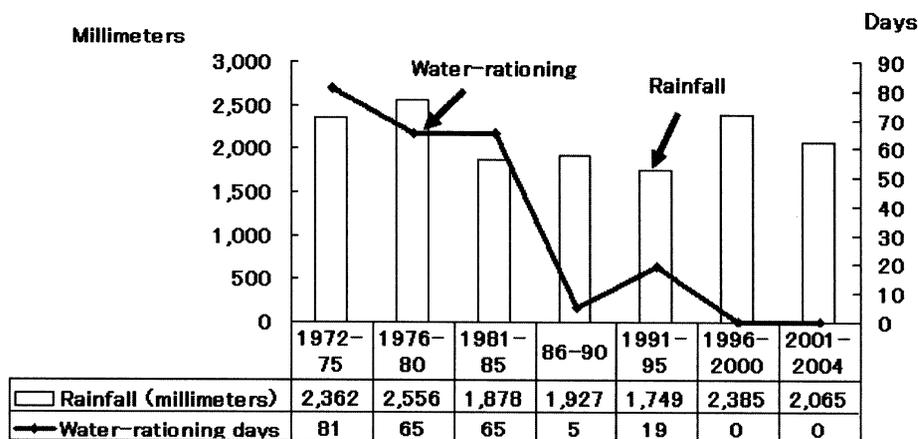


FIGURE 9. Okinawa's Average Yearly Rainfall and the Number of Water-rationing Days.

Source: Constructed from Water Resources Statistics of the Okinawa Prefecture Water Enterprise Bureau.

Water supply in terms of quantity and quality has been a serious issue for Okinawa and particularly for small outlying islands. TABLE 4 shows water balances (supply minus demand) which indicate various sources of drinking water and its use for Okinawa Prefecture and Miyako Island. For Okinawa, water resources have rapidly shifted from river water (from 55% to 21%) and underground water (from 31% to 8%) to dams (15% to 68%) in the past 30 years to meet the increasing demand for water consumption. The site to construct a future dam, however, is extremely limited on the mainland of Okinawa.

TABLE 4. Water Balances of Okinawa and Miyako
Islands: 2004

	Okinawa Island	Miyako Island
Total rainfall	2,065	36.4
Evaporation	516	9.1
Surface water	1,446	15.3
Surface runoff	332	15.3
Riverwater	1,113	0
Used water	33	0
Unused water	1,080	0
Groundwater	103	12.0
Used water	12	7.8
Unused water	91	4.2
Total withdrawal	158	7.8
Used riverwater	33	0
Used groundwater	12	7.8
Dams	113	0
Desalination	4	0
Actual supply of water	142	7.0

Unit: $10^6 \text{ M}^3/\text{yr}$.

Notes: Total rainfall=Yearly rainfall (mm/yr) x total area (km^2).
Leakage rate=10%.

Sources: See FIGURE 9.

Miyako Island has been a showcase for occasional water shortage and droughts because of its flat topographical conditions. The island has no river. Thus, the groundwater has been a lifeline for nearly 50,000 islanders. The islanders, however, discovered that they could store rainfall water underground by constructing subsurface or underground dams. The first underground dam was completed in 1979 with 0.7 million m^3 storage capacity for irrigation (mainly sugarcane fields). The second and third dams were completed in the 1990s to the total storage capacity of 20 million m^3 which are enough to irrigate entire sugarcane fields.

The structure of the underground dam is shown in APPENDIX FIGURE 2. An underground dam is defined as "an artificial structure constructed in geologic strata containing groundwater flow that is blocked and stored for use" (Miwa, Yamauchi and Morita, 1988). Miyako Island is formed by the porous Ryukyu limestone which has high permeability rates. Rainfall percolates rapidly into the ground and is stored as groundwater in between limestone strata and siltstone strata (bed rock).

Despite the construction of expensive underground dams, Miyako Island's water balance has been deteriorating every year due largely to the influx of tourists (FIGURE 10). It is highly questionable whether or not the current water supply capacity can meet the future demand.

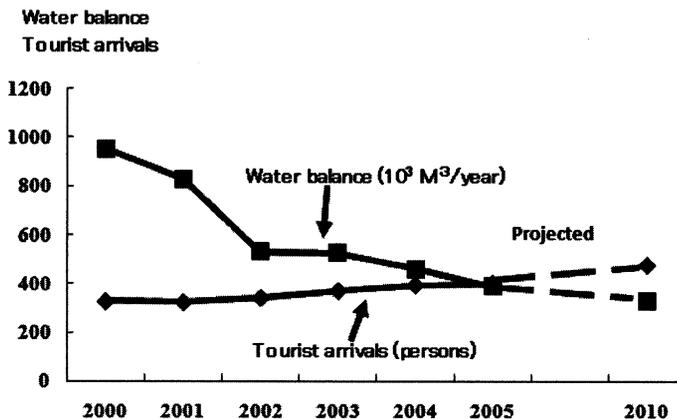


FIGURE 10. Tourist Arrivals and Water Balance of Miyako Islands: 2000-2010.

Source: See FIGURE 9.

In addition to the increasing demand for water and energy resources as population and tourists increase, the economy's carrying capacity and environmental disruptions will become serious impediments to future development. It is particularly serious for Okinawa where tourism, which depends on clean, sunny beaches, is the most important engine of the economy. There is already sufficient evidence to suggest that Okinawa's world-renowned coral reefs are on the verge of extinction due largely to global warming, overfishing and various construction activities. It is particularly important to assess whether or not Okinawa's small, environmentally fragile islands can sustain their ever-increasing de facto population with their extremely limited capacity of renewable as well as non-renewable resources. Therefore, capacity as well as capability building towards sustainable island development is a crucial issue.

With the increasing number of tourists and cars, air pollutions is another serious constraint for future sustainable tourism in Okinawa. As is shown in FIGURE 11, Okinawa's air pollution in terms of CO_2 emission has increased by over 40% since 1990 along with a rapid increase of automobiles. Okinawa's per capita CO_2 emission is twice as high as Japan proper. The increasing air pollution is not only a limiting factor for Okinawa's sustainable tourism, but it also contributes to damage Okinawa's image of healthy and longevity island.

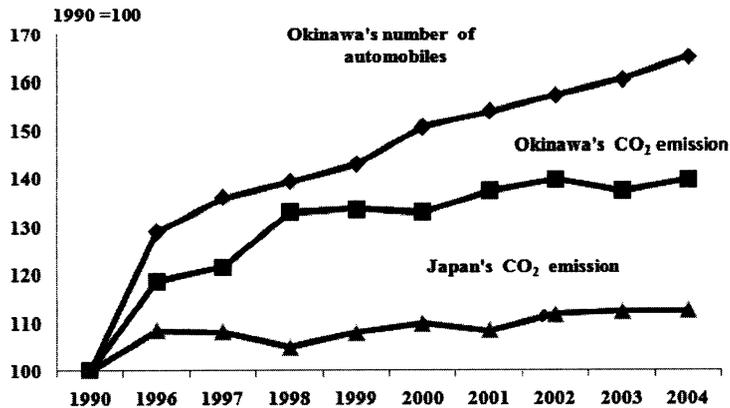


FIGURE 11. Automobile Ownership and CO₂ Emission: 1990-2004.

Sources: Okinawa Statistical Yearbook and the National Institute for Environmental Studies.

4. Approaches to Sustainable Tourism Development

Net Present Value (NPV) Approach

I would like to suggest two popular methods to evaluate carrying capacity and environmental disruptions to Okinawa's infrastructure such as transportation, water and environmental resources and amenities which support sustainable tourism. One is the method of the "Net Present Value (NPV)" approach. Here I present just a skeleton of the method as follows:

R = Present Value of Tourism Resources (i.e. water, electricity, amenities, beaches, etc.)

DPV = Discounted Present Value of future tourism resources

i = discount rate

n= number of years a particular renewable and non-renewable resource can be used

then, DPV can be formulated as

$DPV = R/(1-i)^n$, or $(1-i)^n = R/DPV$.

If the present economic "use value" of a particular tourism resource, i.e., water or coral reefs is \$100 million, how should this resource be valued by the present generation if we have kept the same amount of resource without using it up to now? The valuation depends on two variables; the length of time (n = year) and discount rate (i). As is

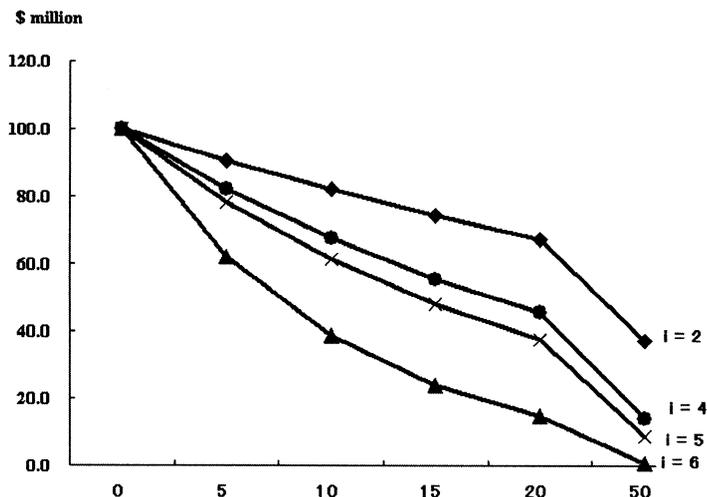


FIGURE 12. A Hypothetical Example of Present Value of Future Tourism Resources.

Source: Constructed by H. Kakazu.

shown in FIGURE 12, the longer the time horizon and higher the discount rate, the lower will be the present value of the resource.

The present value of a future (n=5-year) \$100 million will be worth \$90 if we discount the amount by 2% per annum. The present value will become only \$37 for fifty years (n=50). If we discount the amount with 10% for fifty years, the present value will be almost zero. This will clearly suggest that the value of an environmental resource such as pristine, unspoiled coral reef will be worthless for poor fishermen presently if their living standards are not improved without utilizing it. The discount rate of a particular economic resource will be higher the lower the living standards.

Contingent Valuation Method (CVM) and Value of Corals

The CVM method has been used widely in recent years to evaluate the economic value of tourism resources such as landscapes, coral reefs, flora and fauna, amenities, etc which are not easily valued through market transactions. The CVM method involves asking people directly about “how much they would be willing to pay (WTP) for specific value of environmental services,” or “how much they would be willing to accept (WTA) in compensation for giving up specific environmental services.” Therefore the method is contingent on a specific hypothetical scenario and questions asked (see more detail in Kakazu, 2007). Of course there are mainly limitations and assumptions we need to be aware of before we

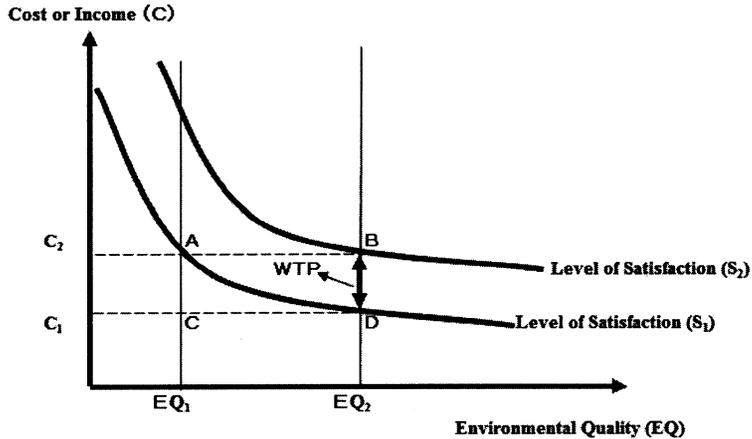


FIGURE 13. A Concept of Contingent Valuation Method.

Source: Kakazu, H. (2007).

apply the method.

FIGURE 13 demonstrates the basic concept of the CVM method using a conventional diagram. The vertical axis indicates costs or income a consumer should pay in order to improve its environmental quality (EQ) which is drawn on the horizontal axis. S_1 and S_2 indicate the level of consumer's satisfaction or "utility function" if you wish to use economic jargon. Of course S_2 gives greater satisfaction than S_1 , and any point on the same curve gives precisely the same level of satisfaction which is called "indifference satisfaction curve." The willing to pay (WTP) can be defined as the difference between S_2 and S_1 ($S_2 - S_1$) because the level of consumer satisfaction has not changed from A to D despite the consumer having to pay environmental costs ($C_2 - C_1$) in order to improve its environmental quality from EQ_1 to EQ_2 . Thus ($C_2 - C_1$) or BD in the figure can be considered as "compensating surplus" or the maximum amount of cost or income forgone in order to obtain EQ_2 level of environmental goods.

TABLE 5 shows an interesting result of the CVM application on Okinawa's coral reefs. Tourists in Onna village are willing to pay 12,209 yen to conserve its coral reef, while visitors to Kerama islands and Naha citizens will pay 10,762 and 6,982 respectively. The study demonstrates that the value of environments will differ greatly by place, incomes, interviewees, age, sex and probably the way a survey is conducted. The CVM method needs a lot of refinements and improvements to be usefully applied to a particular project and situation.

TABLE 5. Willing to Pay for Conservation of Okinawa's Coral Reefs
(2003, person, yen)

	Kerama Island (visitors)	Onna Village (visitors)	Naha (citizens)
Sample persons	142	639	674
Average amounts	10,762	12,209	6,982
Standard deviations	2,147	1,091	663

Source: Sukpil Oh (2003)

The United Nations Environmental Programme (UNEP) released an interesting report in January 2006 on the value of coral reefs. According to the report, the total economic value of coral reefs is estimated at between \$100,000 and \$900,000 per square kilometer per year. The value of coral reefs critically depends on the incomes generated through utilizing coastal zones. Since the tourism industry in most small island economies including Okinawa almost entirely depend on coastal resources, we need to assess the costs and benefits of preserving the coral reefs. The report says “close to a third of corals have gone, with 60% expected to be lost by 2030.”

Social Carrying Capacity (SCC) of Tourist Sites

Carrying capacity of island tourism has been widely discussed in recent years (see references cited by Choi and Sirakaya, 2005). Social carrying capacity (SCC) of tourist sites can be defined as socially determined maximum number of tourists which are tolerated by local communities. The SCC is usually analyzed both from the local residents and tourists standpoints. The latest study by Brandolini and Mosetti (2005) concluded that “the residents’ SCC is lower than the visitors’ SCC, and the site SCC is the result of a compromise between these two aspects of the SCC.” Brandolini and Mosetti suggested two approaches of measuring SCC. One is conventional cost-benefit analysis (CBA) based on the maximization of individual preferences. The other approach is to let local residents determine the maximum number of acceptable tourists through the majority vote rule.

FIGURE 14 illustrates tourism social carrying capacity (TSCC) applied to Okinawa. The vertical axes and horizontal indicate costs and benefits or tourists’ expenditures, and the number of tourists from 1995 to 2015. The vertical axis downward also indicates the number of employment generated directly and indirectly by tourists’ expenditures. We do

know these FIGURE except the private as well as social costs of accepting tourist. The total net benefit from tourism activity (TNB) is defined:

$TNB(N) = \text{Private Net Benefit (N)} - C_s(N) - C_e(N)$, where C_s and C_e stand for the social costs such as noise, pollution, stress from crowding, and so on, and the value of environmental losses, respectively. N stands for the number of tourists per day. The maximum number of tourists which are tolerated by local communities can be determined by the following utility maximization rule:

Net marginal benefit = social and environmental marginal cost including environmental marginal costs.

This is where the social cost (SC) curves intersect with the private net benefit curve (PNB) in FIGURE 14.

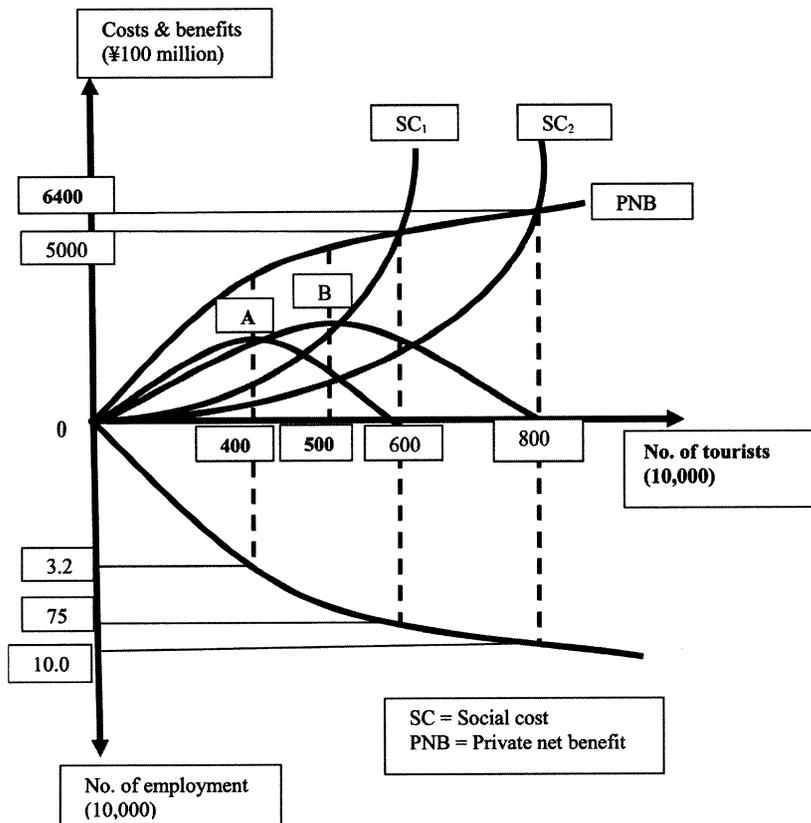


FIGURE 14. An Illustrative Concept of Okinawa's Tourism Social Carrying Capacity.

Source: Kakazu, H. (2007).

The net marginal benefit is the additional net benefit generated from the additional number of tourists. Social marginal cost is the additional cost per tourist arrival in Okinawa. If we assume Okinawa's utility (satisfaction) curve from tourism rises as the number of tourists increases, and then declines as a result of overcrowding and environmental disruptions, then we can draw utility function like the shapes A and B in the FIGURE 14 depending on the degree of tolerance. Obviously, the shape A is more hospitable to tourists than the shape B.

If the shape A is the genuine utility or tolerance curve, then Okinawa's optimum TSCC is determined at the intersection of SC_1 and PNB where 6 million tourists with ¥500 billion tourists' expenditures and 75,000 local employment are maximum social net benefits Okinawa can generate from tourism activities. Okinawa will experience net social loss if tourist arrivals exceed 6 million. On the other hand, if the tolerance curve is the shape like B, the optimum number of tourists will be 8 million where SC_2 intersects with PNB in FIGURE 14.

The optimum TSCC depends on the number of geographical, socio-economic, ecological, cultural, administrative and political factors on which reliable data are not always available.

5. Concluding Remarks: Towards Okinawa's Sustainable Tourism Development

Future Prospects based on a SWOT Analysis

Okinawa's tourism industry faces challenging issues to be resolved. This author has made a preliminary SWOT analysis on Okinawa's future tourism by sending questionnaires to 30 selected researchers, policy makers and business leaders in Okinawa. **SWOT**, which stands for **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats, has been widely and effectively used to identify and assess competitiveness and future opportunities as well as external threats to one's business environment. The SWOT framework offers a simple yet powerful tool to craft a business strategy. Here we will just introduce an outline of the analysis. Just think about answers to the following questions about tourism in Okinawa.

Strengths:

- *What are the **comparative advantages or strengths** of Okinawa's tourism industry?
- *How well has the industry performed in recent years?
- *Is Okinawa endowed with enough resources to realize its comparative advantages?
- *Would a third party favorably evaluate Okinawa's advantages?

Weaknesses:

*What are the **comparative disadvantages** within Okinawa's tourism industry?

*How far can stakeholders in the tourism industry take risks in an ever-changing business environment?

*What are the sources of business confidence in Okinawa's tourism industry?

Opportunities:

*Are Okinawa's comparative strengths in tourism sustainable taking into account the expected future changes to the tourism environment, such as demand, new technology and competition?

*What are the "sellable" resources to meet future business opportunities?

TABLE 6. A SWOT Analysis of Okinawa's Tourism

Conditions	Main Results
Strengths	Semi-tropical, warm weather with pristine, beautiful beaches and marine resources Abundant islands' floras and faunas which have been praised as the "Galapagos of the Orient." Rich cultural heritages and unique historical experiences with stable socio-political environments Warm-hearted, hospitality, courtesy-minded peoples Geopolitical center in the Pacific Ocean flanked by rich, emerging East Asian economies World's longest life expectancy with various healthy foods and healing environments Diversified accommodations and tourist facilities Others?
Weaknesses	Occasional typhoon visits in summer and cool and bad weather in winter Insularity and remoteness requiring high transportation and communication costs Isolated and unconnected tourism facilities Over dependency on Japanese tourists Lack of infrastructure and supply of utilities inviting traffic congestion and occasional water shortages Lack of globally active human resources
Opportunities	High reputation and brand name as resort and healthy islands Constant and continuing improvements on tourist facilities Expected rising inbound tourist demand from East Asia, particularly from China and Korea A center of international exchanges of academic, cultural and sports activities Relatively rich young population with higher education Relatively clean, unpolluted natural environments Appeal of "healthy islands"
Threats	Keen competition from the similar islands' resort destinations such as Guam, Hawaii, Saipan, Bali Geopolitical risk of having large military bases Limited islands' carrying capacity and environmental sustainability Declining trend of population Declining image of "healthy islands"

Source: Kakazu, H. (2005).

Threats:

*What are the immediate problems facing Okinawa's tourism industry?

*How do stakeholders assess their competitors' strengths?

*Are changing demand, technology and financial environments threatening Okinawa's future tourism industry?

The following table has summarized the main results of the survey which confirm what we have already discussed in this chapter.

A Casino Controversy

Okinawa Governor, Mr. Hirokazu Nakaima, who was elected to the post in 2007 by a wide margin, announced an important message with regard to Okinawa's future tourism development. He proposed to introduce legalized gambling or land-based casinos which are now prohibited by the national law. The message caused a wave of controversy among residents. The governor's intention was to increase tax revenues, per capita tourist consumption and foreign tourists which continued to decline in the past years. Those opposed to the idea typically argue that legalized gaming or casinos are associated with negative impacts such as higher incidence of crime, pathological gambling, and other social problems which are difficult to quantify.

Even quantifiable economic and fiscal impacts are identified, they are not fully convincing the local people to introduce the casinos. Hawaii once studied the economic impacts of shipboard gaming and pari-mutuel horse racing when its tourism industry stagnated in the early 1990s (Hawaii Department of Business, Economic Development, and Tourism, 1996). The study concluded that net economic and fiscal impacts on Hawaii's economy were uncertain mainly because of "substitution effects" of tourists' spending. That is to say these forms of gambling will not attract "new" dollars, but will cause a shift in spending patterns which will ultimately hurt existing domestic businesses. After careful study, Hawaii decided not to introduce the casinos. Hawaii and Utah are only states which do not host the casinos.

In addition to social costs and substitution effects, we need to question whether or not the casino tourism is compatible with Okinawa's clean and healthy island image. We also need to examine whether or not Okinawa can compete with well-established casino destinations such as Macao and Las Vegas.

The Tourism Satellite Account (TSA)

In concluding this chapter, we need to touch on the Tourism Satellite Account (TSA), proposed by the World Tourism Organization (WTO), the Organization for Economic Cooperation and Development (OECD), and the Statistical Office of the European Communities (Eurostat). The TSA was approved by the United Nations Statistical Commission (UNSC) at its thirty-first session in March 2000.

The TSA is a new approach to understanding the economic impacts of tourism:

From an economic perspective, the increasing efficiency in collecting information relative to the activities of people during trips abroad and domestically, in places outside their usual environment, is commensurate with a growing desire to analyze tourism economic impacts on the overall economy in respect of goods, services and employment. This approach, in considering visitor activity, is underpinned by its consideration as a consumer activity, in the broad sense of the term. However, in order to perform economic analyses of tourism, it is not only necessary to identify the goods and services consumed by visitors but also the resources these visitors use in the course of their trips, hence the need to identify the economic units that supply each type of product consumed by visitors. Accordingly, both the demand and supply side of tourism are equally relevant to the consideration of tourism impacts.” (WTO, 2001).

The TSA will provide a variety of information on tourism activities ranging from tourism’s contribution to the economy of a given region or country and its ranking relative to other sectors and in comparison with other regions or countries. Planners and entrepreneurs will make more accurate decision-making if these statistical information are readily available.

Compared to Europe, particularly to Spain and France, Japan’s system of tourism statistics is still at its infant stage. Even current basic statistics on tourism such as the number of inbound and outbound tourists, per capita spending, the length of stay are not satisfactory. Per capita tourist expenditure of Okinawa, for example, declined from ¥92,000 in 2000 to ¥85,000, or 7.6% in 2001 due largely to the change in the survey method from “postcard questionnaires” to “in-flight passenger questionnaires” (see FIGURE 15). As we have seen a small change in per capita spending makes a big difference in the aggregate amount. The economic impacts of tourism on sectoral GDP, employment, balance of payments and taxes, which we derived based on Okinawa’s input-output TABLEs were subject to the number of strong assumptions with insufficient statistical

information. The TSA will be a useful tool to analyze tourists' behaviors both quantitatively and qualitatively. A task team should be established through the joint initiatives of the Okinawa Prefecture and concerned researchers to study Okinawa's TSA.

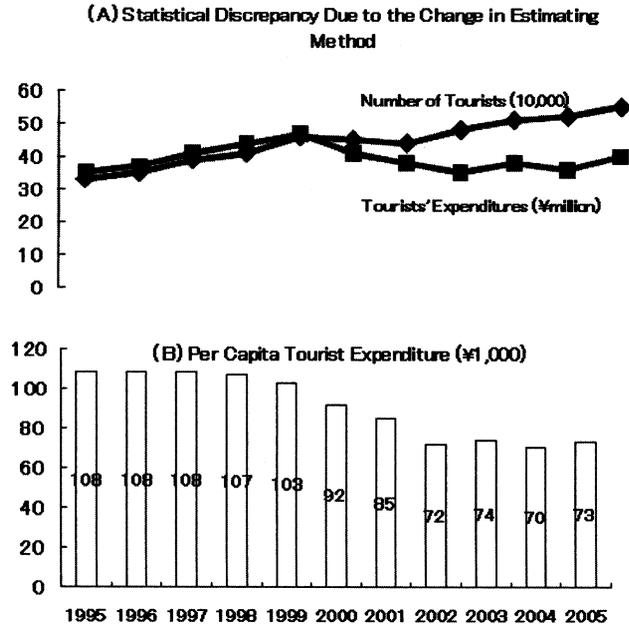


FIGURE 15. Okinawa's Tourism Statistics.

Source: See APPENDIX TABLE 1.

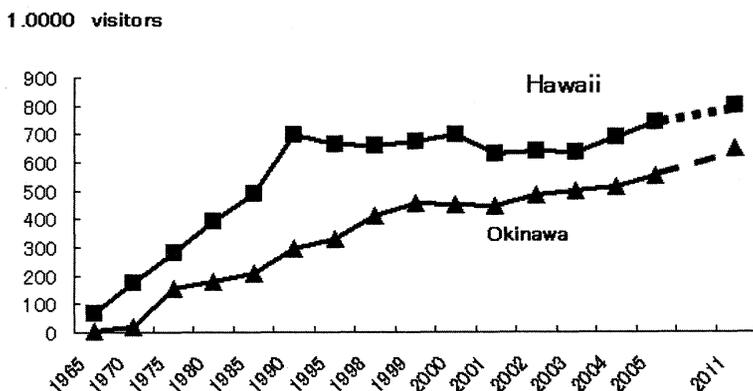
APPENDIX TABLE 1. Main Indicators of Okinawa's Tourism

	Unit	Actual Performance					Targeted	
		2002	2003	2004	2005	2006	2007	2011
Number of tourists	10,000	483	508	515	550	565	580	650
Foreign tourists		18	10	13	14	NA	25	60
Per capita tourist spending	¥1,000	72	74	70	72	77	80	109
Tourism receipts	¥100 million	3,466	3,754	3,631	3,984	4,104	4,800	7,085
Average length of stay	day	3.8	3.9	3.7	3.4	3.9	4.8	7.1
Rate of repeater	%		62		69	69	NA	NA
Number of hotel rooms	room	25,423	27,533	28,303	31,238	NA	31,200	33,500
Room capacity utilization	%		75	73	74	NA	NA	NA
Number of study tours	1,000	286	336	393	426	NA	NA	NA
Cruise ship visits		72	47	71	NA	NA	90	200
Resort weddings	pairs		2,500	3,500	NA	NA	7,500	10,000
Number of conventions		486	687	649	NA	NA	730	650
International conferences		31	23	35	NA	NA	45	50
Sports conventions		146	174	192	NA	NA	220	240

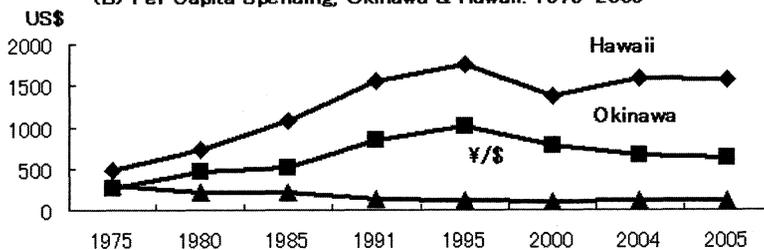
Notes: NA=Not Available. Okinawa Prefectural Government has revised the targeted figures for 2011 recently. The number of tourists, for example, has revised from 6.5 million to 7.2 million for 2011. But these figures are still tentative at this stage.

Source: Okinawa Prefectural Government, Statistics on Tourism.

(A) Inbound Visitors, Okinawa & Hawaii: 1965–2011



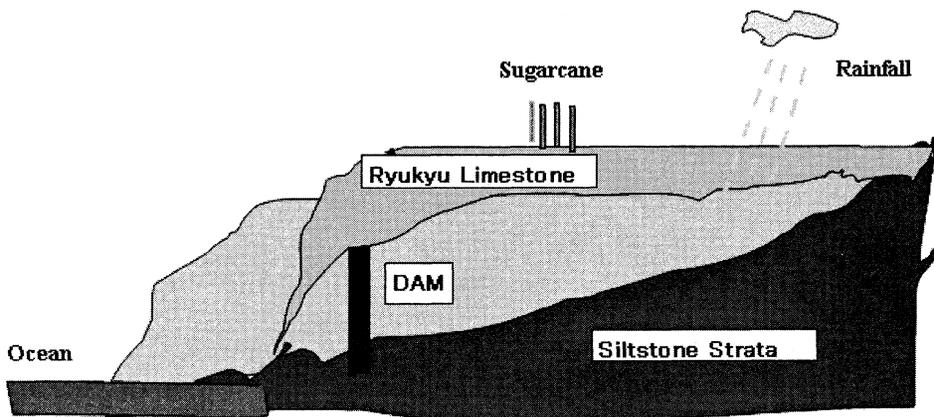
(B) Per Capita Spending, Okinawa & Hawaii: 1975–2005



APPENDIX FIGURE 1. Tourism Development of Hawaii and Okinawa.

Sources: See Appendix Table 1, Japan's *White Paper on Tourism* and Hawaii's Department of Business, Economic Development & Tourism

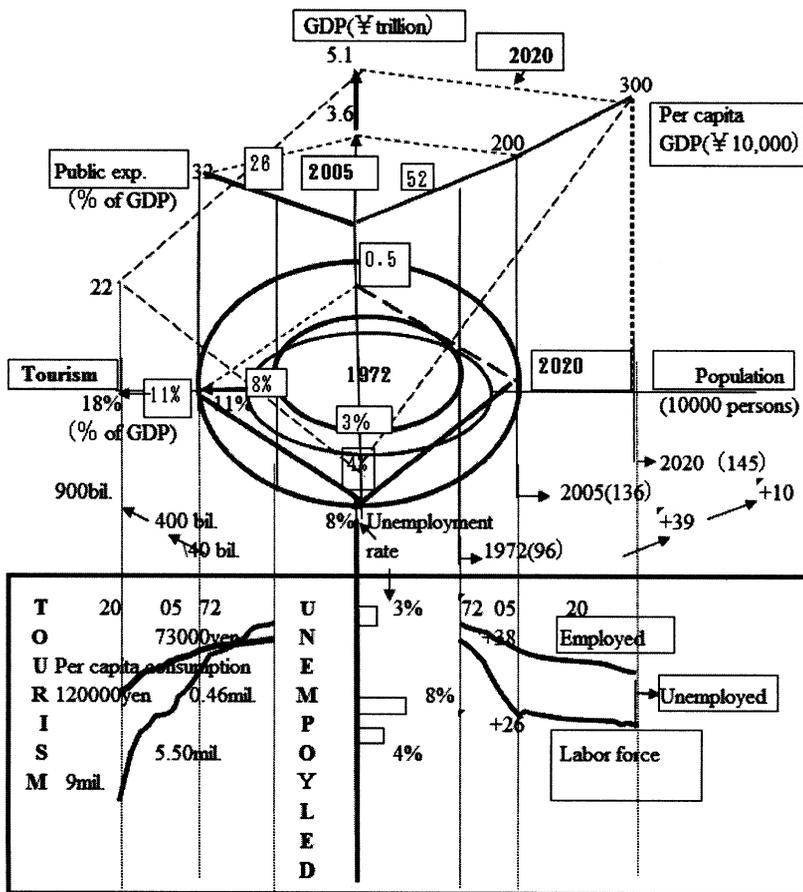
Note: Figures for 2007 and 2011 are targeted numbers in the "Tourism Promotion Action Plans."



APPENDIX FIGURE 2. Structure of the Subsurface Dam of Miyako Island.

Source: Kakakzu, H. (2006).

APPENDIX FIGURE 3 presents a grand macro view on Okinawa's economy from the past (1972), present (2005) and future (2020). The diagram shows important variables including GDP, population, per capita income, labor force, unemployment, public expenditure and tourism development. The tourism industry, Okinawa's most important leading industry, is projected to grow about 50% in terms of tourism income by 2020. Despite various issues to be resolved, the expansion of tourism industry will contribute to Okinawa's self-reliant development through creating employment and reducing a heavy dependency on fiscal transfer expenditure.



APPENDIX FIGURE 3. A PPF Analysis of Okinawa's Tourism Economy.

Notes: Brundtland, H.G. (1987), p.5.

Miwa, N., Yamauchi H. and D. Morita. (1988), p.124.

UNEP-WCMC (2006), p.5.

Brandolini S.M. and Mosetti R. (2005), pp.1-10.

World Tourism Organization (WTO, 2001), p.1.

Source: Constructed by Kakazu, H. (2005).

This three-dimensional model can be applied to any island economy and can be expanded to include many related variables. If we feed in exogenous variables into the hidden equations, we can instantly obtain a PPF diagram. Anybody wishes to challenge for improving the model?

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(要約)

持続可能な島嶼観光における「社会的キャリング・キャパシティ (環境容量)」に関する一考察：沖縄を事例にして

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沖縄を含む太平洋島嶼地域にとって、観光産業は対外受け取り総額の20-70%を占める基幹産業であると同時に、今後の成長産業でもある。観光は貴重な「外貨」を稼ぐ「サービス産業」であると同時に、「平和産業」、「文化産業」であり、これらの島嶼地域のもつ、ユニークな自然、気候風土、文化、ニッチ市場、人的資源をフルに活用しうる複合・連携型産業である。島嶼観光は、水、電気、交通・通信、ゴミ処理施設などの生活インフラはむろんのこと、島嶼の限られた、しかも壊れやすい自然環境資源と人々の「ホスピタリティ・マインド (社会的心理状態)」に大きく依存していることもあって、これらの観光資源の社会的キャリング・キャパシティが課題になって久しい。特に沖縄への入域観光客数は、「沖縄ブーム」の追い風を受けて、復帰後の35年間に12倍、県人口の4倍に達し、予想以上のペースで成長していることから、受け入れのキャパシティが問われている。沖縄県は今後10年間で、一千万人 (県推計人口の7倍) の観光客受け入れを目論んでおり、観光のみならず経済効果と同時に、そのマイナス面も議論する時期にきている。果たして、沖縄の自然環境、生活インフラは、(水だけでも県民の3倍もの量を消費すると言われていた) 一千万人の観光客を収容しうる環境容量があるかどうかが問われている。

本論の目的は、成長が持続する沖縄観光に焦点をあて、島嶼観光の現実と課題、その持続可能性、キャリング・キャパシティについて、利用可能なデータを駆使して検証する。特に沖縄観光のキャリング・キャパシティについて、種々のアプローチを試みた。キャリング・キャパシティの制約要因の中で、座間味村ですでに顕在化しているように、水供給と環境汚染に加えて、過度の財政支出が最も深刻な問題になることが考えられる。これらの問題を解決する手法も提示した。沖縄観光のキャリング・キャパシティについての測定は限定的ながらすでになされているが、しっかりした理論フレームの下での信頼できる膨大なデータ収集が要求されることから、個人レベルでの研究には限界がある。ここで提示したデータとアプローチは、その初歩的な段階であり、今後のフォローアップに期待したい。

キーワード : island sustainable tourism, Okinawa, comparative advantage, social carrying capacity, Net Present Value (NPV) approach, Contingent Valuation Method (CVM), SWOT analysis, sustainable indicators, water shortage, cultural friction, nonrenewable resources