Nature-based Tourism in Small Islands Adjacent to Jakarta City, Indonesia: A case study from Seribu Islands

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Abstract : In this paper, the nature-based tourism is described as one of the tools to achieve sustainable development in small islands. The study was carried out at Ayer, Bidadari and Onrust Islands of Kepulauan Seribu chains at Jakarta Bay, Indonesia. While the historical records show that previous uses of such islands have started at sixteen century, tourism uses was started at the beginning of 1970s. Among nature-based tourism destination in Kepulauan Seribu chains, these islands are the famous destinations and received a lot of tourists. Tourism growth at these islands has stimulated development of numerous tourism facilities and infrastructure to meet visitor satisfaction. It is observed in this study that island's site-plan destination design has contributed to the successful and sustainability of tourism in small island. The key success lies on the successful integration and implementation of three substantial perspectives into practices, namely economic, ecosystem and social perspectives. First, in order to enhance economic benefits, a site-plan design allowing floating cottages establishment to extent room availability, to build strong images as tropical paradise islands, and to enhance tourist satisfaction with the objectives of improving income and sustaining tourist loyalty to the destination. This design is also reducing land risk from tourism impact and it becomes the significant key of second perspective, the ecosystem perspective. Moreover, the ecosystem perspective has been implemented through native vegetation preservation that led island's wildlife conservation and became potential tourism attraction. The design also develops effective mechanism to manage and regulate visitor flows by establishing visitor track corridors. In implementation, such corridor plays an important role to reduce tourist density in single places and therefore become instrument to reduce severe visitor impact to wildlife, vegetation and heritages of islands. Third, the social aspect of development allowing heritages to conserve and furthermore serve numerous benefits for education, socio-political, culture, and historical studies. Through this study, it is clear that the success of these islands to continuous tourism growth lies on the island's vision to integrate economic, ecosystem and social perspectives on tourism development.

Keywords : island conservation, nature-based tourism, Kepulauan Seribu, small islands

Introduction

Kepulauan Seribu is the islands chain in the northwest of Jakarta. This chain islands consist of 342 reefs platforms, and only 110 have vegetated cays that have size larger than half an acre in Jakarta bays. Among them, only 11 islands were inhabited by 15,600 people which originated from varied ethnics such as Betawi, Bugis, Bantenese, Madurese, and Javanese. Mostly people concentrated at Pramuka, Kelapa and Karya Islands, where the main activities of islands dwellers are fishing and collecting marine resources (Tomascik *et al.*, 1997).

As tropical islands, the biodiversity of Kepulauan Seribu has known diverse and high. For instance, there are at least 700 individual reefs species in this ecosystem. The list of Schelectinians (individual which composing hard coral) was reach 193 species. About 36 coral

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fish species has identified around Tikus, Burung, Pari, Kudus and Kongsi Islands where the density was estimated to 30,660 individual/ha (Latief and Wudianto, 1992). The study about marine invertebrate species had done and showed that the island chain was the center of marine invertebrate diversity (Tomascik *et al.*, 1997).

Considering the vast biodiversity resources and human threats, a legal aspect to protect Kepulauan Seribu leads the establishment of protected systems in Jakarta bays. The legal effort to conserve Kepulauan Seribu was initiated by Decree of Ministry of Agriculture No. 527/Kpts/Um/7/82, in July, 21 1982. About 78 islands of 110 islands and 108,000ha water body surrounding the islands area were declared as Marine Reserve Area. According to the 1982 management plan, the objectives were to protect the hawks-bill turtle nesting beach, and maintaining a productive reef ecosystems for tourism, fisheries and education purposes (Salm *et al.*, 1982, Whitten *et al.*, 1996). In the Second International Congress of National Park in Bali, October 1982, the area had been proposed to and became marine national park. Kepulauan Seribu formally became marine national park in 2002 under the supervision of Department of Forestry, Republic of Indonesia.

While biodiversity of Kepulauan Seribu has been protected through marine national park establishment, recent survey by UNESCO indicated that the condition of coral reefs in Kepulauan Seribu is continuously declining. Physical destruction of reefs by fish bombing, cyanide fishing, coral mining and dredging leads destruction of coral reefs ecosystems. UNESCO reported that some island in Kepulauan Seribu has disappeared due to resources over-exploitation. Report of coral reefs destruction by Kristina et al (1996) and Yuliana (1996) shows that destruction occurs in the core zone and buffer zones of the park, indicating that coral reefs destruction become serious threats to park. There are also many reports revealing that marine pollution become serious problem, and frequently damage the ecosystem. As a result, water quality degrades due to industrial pollution and nutrient enrichment (Tomascik *et al.*, 1997).

The issues of sustainable uses of natural resources become crucial in many regions in Indonesia. It is because many known areas with biodiversity richness are now facing numerous environmental problems due to fast development grows. Considering such situation, the vision of Indonesian government accepts sustainable development as a development strategy to be implemented in order to achieve nation objectives and furthermore contribute to the world vision on development (Kantor Menteri Negara Lingkungan Hidup, 1997). Throughout the world, there are numerous discussions related with mechanisms to achieve sustainable development, and Heywood and Watson (1995) summarized that sustainable development can be achieved by integrating economic, ecosystem and social/cultural perspectives into planning and implementation. Recently, ecotourism or nature-based tourism became famous model to test sustainable uses of resources and development. Many scholars argue that such tourism has its potential and substantial to both local people and national economy, provide long term local employment, improve local people capacity, and generates fund for conservation without damaging biodiversity (Hvenegaard and Dearden, 1998; Gunn and Var 2002; Christ, *et al.*, 2003; Drumm, 2004). In Indonesia, these ideas has been promoted and drafted to implement in 2003-2020 development scenario (Kantor Menteri Negara Lingkungan Hidup, 1997). The governmental documents also reveal

that such tourism is significant sector for foreign earning, and furthermore its development should meets sustainable development agenda (Nirwandar, 2006; Kantor Menteri Negara Lingkungan Hidup, 1997).

Tourism has grown in Kepulauan Seribu and it is successfully implemented. Considering the huge number of small islands throughout Indonesia, the model of tourism destination development in Kepulauan Seribu become significant model to explore. Nevertheless, little information available, and therefore, this paper aims to describe the development of tourism in Kepulauan Seribu. The discussion is based on a synthesis of several published studies and fieldwork, made by the authors in Ayer, Bidadari and Onrust Islands (Fig. 1).

Tourism in Kepulauan Seribu

The history of Kepulauan Seribu and human activities in islands can be traced back in sixteen century. In 1615, the island of Onrust had been used for repairing the Dutch Company's ships in Southeast Asia, even before Batavia (previous name of Jakarta, the capital city of Indonesia) was founded. For more than two centuries the island was used for ship repair as well as for storage. In 1679, The Dutch East India Company (Vereenigde Oostindische Compagnie VOC) builds hospital in Onrust Island. In 1849 a military tower as defense system was build in Bidadari Island, a neighbors of Onrust Island. During war between Dutch and English in Java Sea in eighteen century, these islands become several target of destruction by England army. After the successful invasion of Dutch to Java mainland, and followed by colonialism more than three centuries, these islands were ignored in Dutch political perspectives. In 1933, Onrust was used as quarantine site purposes for Indonesian Muslim pilgrim to Mecca.

Little information is available to describe the initial stages of tourism in Kepulauan Seribu. Nevertheless, it seems that development has started between 1960s to 1907s when Indonesian national tourism planning was established as development guidance for national tourism development through Indonesia region (Picard, 2006). In Kepulauan Seribu, development of Bidadari Island as tourism destination has started at 1970 when PT Seabrezz held consensus to manage such island and became tourism resort. It was followed by Putri Island development in 1973 by PT. Buana Bintang Samudra. In 1980s

Fig. 1 Ayer and Bidadari Islands

the Saraoma Prima Perkasa held consensus to Ayer Island, and after establishing tourism infrastructures, the island were opened as tourism destination in July 12, 1987. Mainly, the tourism attractions in Kepulauan Seribu close to the islands heritages and its natural richness.

Many website and brochures describe that Kepulauan Seribu is the best place for diving, snorkeling, trekking, jogging, and birding. The shallow water and long white sandy beach are offering spectacular site for swimming, beach-sports, and games. Some island also known as rich in wildlife diversity, and became the best place to observe wildlife. In Rambut Island, the abundance of birds led such island to be known as site for birding. Sea turtle has known abundance and for the conservation purposes, the nesting and hatching area are established in Pramuka Island. Such facilities also serve tourist attractions among visitors in Kepulauan Seribu. It is said that Kepulauan Seribu becomes one of the favorite and first choice of tourism destination among Jakarta's dweller to seek clean and unpolluted areas.

The management planning of Kepulauan Seribu revealed that tourism development only allowed and carried out at 36 islands. However, only 13 islands has been developed as tourism destinations, namely Ayer, Bidadari, Bira Besar, Hantu Barat, HantuTimur, Kotok Besar, Laki, Macan, Besar (Matahari), Putri, Tondan Besar, Sepa Besar, Onrust, and Cipir (Table 1). Mostly, resort lies on the northern part of Kepualauan Seribu, except Ayer, Bidadari and Onrust in the

Table 1. List of island which used as tourism destination in Kepulauan Seribu

Islands	Size (ha)	Company Names	Facilities				
			Cottages/ bungalow	Pool	Conference hall	Restau-rant	Others
Ayer	5-6*	Saroama Prima Perkasa	45	1	-	1	Tennis court
Bidadari	7	Seabreez	80	-	1	1	Drug store
Bira Besar	29	Pulau Seribu Paradise	40	1	-	1	Golf court 9 holes, tennis court
Hantu Barat	na**	Pantara	34	1	1	1	
Hantu Timur	na**	Pantara	1	-	-	1	Souvenir shop
Kotok Besar	21	Kotok Wisata Indah	34	-	1	2	
Laki	30	Faden Gema Scorpio	37	-	1	1	
Macan Besar	20	Matahari Impian Indah	83	-	-	1	Tennis Court
Putri	15	Buana Bintang Samudra	70	1	-	1	Tennis Court, drug store, Undersea Aquarium
Tondan Besar	na**	Pulau Seribu Paradise	32	-	-	2	
Sepa Besar	na**	Sepa Permai	70	-	-	1	
Onrust	12	Government of Jakarta	-	-	-	-	Warung
Cipir	7	Government of Jakarta	-	-	-	-	-

* Original size 5 ha, and reach 6 ha after reclamation.
** no data available

south. Most of them are being managed and operated by private company, except Onrust and Cipir which are controlled by government due to its heritage value. The "New Order"under President Soeharto regime allowed the policy to involved and gave permission to private investors due to minimal budget of government to develop isolated island and establish tourism infrastructure. In addition to that, it is assumed that private companies have skills and experiences to initiate tourism sectors development, sold product through effective marketing strategy, create new jobs for local dwellers, and establish appropriate business planning to ensure tourism sustainability (Seda, 2002; Picard, 2006). The advantages of private sectors participation in nature-based tourism has been recognized, in particular their ability to establishes market network, and their knowledge of product quality standard (Christ *et al.*, 2003; Drumm et al, 2004)

According to Suku Dinas Pariwisata Kepulaun Seribu (2002), previously tourist arrivals to Kepulauan Seribu grown fastly, following the common trends of tourism growth in Indonesia. However, political unrest, ethnic unrest, religious unrest, ecological accidents, terrorism attack, and economic crisis throughout Indonesia regions affect number of tourist decrease and led sharp negative growth during 1997-2002 (Prideaux *et al.*, 2003; Hampton, 2005). Nevertheless, it is interested to note that while number of international tourist arrivals at most of the tourism destination dramatically decreased, including Bali, international arrivals to Kepulauan Seribu seems less affected (Table 2). There are no explanations about such phenomena, but it seems that geographic factors of Kepulauan Seribu and its isolation factors from Jakarta become crucial images to build opinion that crisis would never reach Kepulauan Seribu. Simply, the isolation of Kepulauan Seribu has contributed to build images of safe destination during socio-political crisis and instability. Ayer, Bidadari and Onrust islands have been the most frequently visited because of its accessibility and the presence of complete attractions. These islands are the nearest islands to reach from Jakarta while accesses to other islands are limited to distance and travel cost. According to Andriani (2002) and based on author's survey, these islands received a lot of tourism compared to other island and tourism facilities have been developed to meet tourist satisfactions (Table 3).

Table 2. Tourist arrivals to Kepulauan Seribu

Year	Domestic	International	Total	Change over previous year (%)		
				Local	National	Asia Pacific
1995	143,722	12,991	156,713	-	7.94	3.5
1996	133,219	12,799	146,018	-6.82	16.24	10.6
1997	105,686	10,252	115,935	-20.60	2.99	-1.1
1998	81,125	16,215	97,340	-16.04	-11.16	-0.7
1999	80,105	15,918	96,023	-1.35	2.62	10.8
2000	81,887	14,901	96,788	0	7.12	12.3
2001	82,001	15,038	97,049	0.27	1.76	5.1

Fig. 2 Comparisons of landscape element characters of Ayer, Bidadari and Onrust Islands (all pictures are taken by S.-K. Hong on June 2006).
a : Natural-artificial combined facilities in Ayer Island
b : Facility near coastal area in Ayer Island
c : Cultural resource utilization with nature-based tourism in Bidadari Island
d : Corridor using tropical trees and natural resources in Bidadari Island
e and f : Cultural resource oriented ecotourism in Onrust Island

Table 3. Tourism facilities among islands

Tourist facilities	Ayer	Bidadari	Onrust
Cottages	Floating cottages on the sea and land cottages	Cottage building with Menado ethnic, floating cottages with fishing settlement, meeting room,	Not available
Restaurants	Available	Available, with bar and cherokee	Traditional coffee shop
Tourism programs	Jet sky, canoe, fishing	Wildlife, fishing, archeological sites	Heritage tour, fishing
Parks	Well managed	Well managed	No park
Charges	Expensive	Expensive	Cheap
Support services	Excellent	Excellent	Poor

In practices, the relationship among islands in tourist preference is drawn in Figure 3. Tourist to Kepulauan Seribu was classified into two categories and it has implication in destination choice. Backpacker tourist, both domestic and international, nature lovers and student prefer to choose Onrust Island as destination due to several reasons. It include economical reason, idealism, research purposes and gets experience to close nature. These independent travelers were often use traditional ship from various harbors in Jakarta to reach Onrust with cheap charges. Backpacker tourist refers to tourist who characterized by minimal budget use, longer duration traveling, and use of public and cheap transportation and accommodations. Luxury travelers often join in executive tour package or family who took vacation in Seribu Island. Recently, the trend of these tourist groups involve to natural destinations as drawn by WTO is significantly increasing. Among the advantages of luxury travelers to nature-based tourism are willing and able to pay more for appropriate and excellence service (Murphy and Murphy, 2004). That reason, both Ayer and Bidadari become the main choice for destinations sites.

Island biodiversity and tourism attractions

Biological component of island has been known as a factor of island existence. In particular, vegetation structure and diversity are fundamental among small island. Many author states that stabilization of small island are greatly influenced and enhanced by plants. Vegetation plays an importance role to reduce ocean wave on lands, reducing landslide and minimizing sedimentation to marine environments. Vegetation also serves ecological function for other wildlife. The dynamic relationships of those physical and biotic factors lead the harmony of nature which become the main components and foundations for nature-based tourism practices. There are many descriptions about vegetation of inhabited islands of Kepulauan Seribu, but few information gathered from Ayer, Bidadri and Onrust Islands. Through descriptive survey, we argue that vegetation on island basically consists of two categories based on its origins: native to island and non-native species which introduced from other places.

A rapid survey of vegetation shows that the native vegetation seems to be preserved and plays an important role to conserve island wildlife. Recent woody trees growing and

forming huge canopy to reduce sunlight penetration. In tourism destination design perspectives, such vegetation become significant shading trees, and creates green images of tropical cottages (Baud-Bovi and Lawson, 2002). Some trees stands are reaching 20-30m in high, including *Sterculia foetida*, *Spondias* sp, and *Schleichera oleosa*. Among the interested species is the tall trees *Sterculia foetida* in Bidadari Island that become home and nesting site to Brahmine kite *Haliastur indus* (Apendix I). Vegetation types of Onrust Island relatively encompass deciduous species, where *Swietenia mahagony* was dominant. This island was loss shrubs, herbs and undercover vegetations. There is also no record of ornamental plants introduced. A dense of heritages artifacts affects and become limitation factor for shrubs and herbs to grow. In addition to that, the island guards intensively remove shrubs and herbs to maintain and conserve heritages artifact. Nevertheless, *Ficus benjamina, Samanea saman, Sterculia foetida* and *Tamarindus indica* forming huge canopy and become the shelter of many bird species.

Among visited islands, non-native species were found everywhere, indicating human influence on the island vegetations structure. Basically, non-native species consist of shrubs and herbs (Appendix II) and its introduction to islands seem to be related with improving island parks and ornamental purposes. These species characterized by several features such as growing of dwarf and creeping, and morphologically perform interested plants' organ feature such as leaf and flower. In order to improve garden performance, several species were introduced to island to build an image of tropical destination. It includes *Plumeria acuminata, Bougainvillea spectabilis, Ixora sp.* and *Codiaeum variegatum*. A non-native plant species has been known has ability to change vegetation composition, exploiting water resources, and reducing habitat productivities, and therefore altering habitats and lead to native biodiversity extinction (Cronk and Fuller, 1995 Heywood and Watson, 1995). As far, the management practice for non native plants species were carried out by controlling its abundance through regular pruning, clearing and reducing population with the objectives of enhancing park performances. The gardener said that routinely shrubs and herbs should be controlled to enhance beauty images of island.

Managing density for sustainability

Human and its needs of adequate space become crucial discussion among destination planner to drawn architectural site-plan design, in particular on small island. There are at least two fundamental facts which should be noted during destination site-plan planning process. Firstly, it is clear that the costumers of nature-based tourism are encompasses ecotourist, adventurer, natural expert, and enthusiast, and other people who seek natural and unspoiled environments. They are generally seeks natural environment where people density quite low to ensure their objectives, e.g. wildlife seeing, birding, camping, canoeing, hiking. Moreover, such consumers often display strong interest and involvement in conservation programs (Hvenegaard and Dearden, 1998). Secondly, there is evidence that huge number of visitor to natural destination affects environmental degradation and resources depletion. Abundant tourist to destinations leading to poor controls of visitor's behavior and activities which potentially contribute to landscape and biodiversity degradation (Davis and Tisdell, 1995; Simon et al, 2004). Therefore, the appropriate planning should accommodate and

solve such problems. Foremost these are the carrying capacity that becomes necessary to drawn during planning in order to enhance environments quality and minimize tourism impact to destinations (Jamienson and Noble, 2005). While the concept of carrying capacity has no fundamental definition and in many cases can only be examined in a case-by-case situation, the goal of carrying capacity is clear: achieving sustainability of tourism destination (Simon *et al.*, 2004; Murphy and Murphy, 2004; Jamienson and Noble, 2005). One of the approaches to meet carrying capacity among tourism destination is managing visitor density. Density is defined as the number of size of population (tourist) in relation to some unit of space. The relationship among density, land requirements and its characters were given by Baud-Bovi and Lawson 2002 (Table 4).

Recent information related with the number of visitor to Ayer, Bidadari and Onrust is quite difficult to generate due to business policy. The estimation data gathered from local staffs and ship owner through interviews argue that the average number of visitor to the island was less than 10 people in weekdays, and received 30-50 in weekend and holidays. According to the Baud-Bovi and Lawson (2002), such situation lead Ayer, Bidadari and Onrust to be categorized as destination where large space is available and therefore close to images as contact with nature destination category. It is one of the characters of ideal nature-based tourism destination. Nevertheless, it should be noted that tourist increases in coastal area become the potential factor to contribute uncontrolled tourist flows to islands in the near future. The increased of tourist arrivals to Marina Ancol, the entry gate to Kepulauan Seribu, may become indicators that tourist preference to enjoy coastal area is increasing, and it has possibility to expand their destination to Kepulauan Seribu due to recent positive trend of economic recovery after economic crisis in 1997 (Table 5). A similar figure of the relationship between regional economic recovery and tourism growth has been observed in South East Asia (Hampton, 2005).

Table 4. Density and character images of destination (After Baud-Bovi and Lawson, 2002)

Number of users per ha	Density	Character
Less than 5	Very low	Contact with nature
5 to 50	5 to 50	Large spaces
40 to 300	40 to 300	Uncrowded to crowded
1000 to 5000	1000 to 5000	Very crowded

Table 5. Tourist arrivals to Ancol and economic growth indicator based on GDP.

Year	Visitor to Ancol	Gross Domestic Product*	
		Regional (Jakarta)	National (Indonesia)
1999	12,595,162	6,883,322	1,683,385
2000	12,793,257	7,118,659	1,806,238
2001	12,921,189	7,307,159	1,848,602

Notes.* Per Capita Gross Regional and National Domestic Product without oil and gas at constant 1993 market prices (IDR). Sources: BPS Pusat 2003, BPS Jakarta 2002.

To accommodate visitors' number to the island and land capacity, a site-plan arrangement of island has created with some innovation strategies. One of the strategies is to establish the floating cottages in the flat reefs area of island which has two benefits. First is offering accommodation that allowing visitors to become closer to marine environment where it is quite rare in megapolitan city such Jakarta. Secondly is floating cottages was able to minimize land allocation needs for tourism infrastructures and facilities, and furthermore serving large spaces for green area to meet nature-based tourism destination characteristics. Floating cottages were established in traditional architectures, where Papua themes are dominant in Ayer Island and Manado (South Sulawesi) themes in Bidadari Island.

Furthermore, the site plan also synthesize circulation corridor for tourist to explore islands facilities and attraction were established. The circulation corridors are conjoining each attraction in best ways. According to some authors, circulation corridor also breaks visitor concentration in single point of destination, and facilitate visitor moves and flows to reduce density (Baud-Bovi and Lawson 2002; Gunn and Var, 2002). This strategy led visitors' concentration to interested part of the island distributing equally and therefore enhancing heritages conservation.

The site-plan arrangements appropriately support wildlife conservation by preserving native shrubs and tall vegetation growth to serve habitat needs. As demonstrated in Bidadari Island, the conserved native ecosystem and wild coastal shrubs become significant habitat for wildlife such as Varanus salvator. In order to protect coastal abrasion, reforestation programs carried out by reestablishment of mangrove ecosystem in some part of island and followed by greenery action programs in island surface. These findings suggest that benefits of tourism in small island is clear, supporting island conservation and serving programs to enhance island sustainability in situation where central government lack of funding and resources to implement conservation agendas.

Besides developing landscape design approach, the authorities also introduce economical tool to manage and control number of visitors to the islands. It is carried out by implementing pricing policy of charges fees. According to Laarman and Gregersen,(1996), charged fees can be used as management tools to reduce visitor crowding in destinations, and furthermore contribute to resources preservation. In particular, Ayer and Bidadari charge an expensive ticket to enter these destinations. For the visitor who did not registered as island guest (usually belong to tourism tour groups and booking cottages for several nights), ticket only valid for one hours and if visitor wants to extend their time in such island there are some additional charges for extension. While this policy led visitors to control their spending times in islands, another advantage is the policy which could be able to generate more income from the visitors.

All the efforts are in fact become the excellent tools to manage small island in accordance to visitor density management. There have been so far no indications of islands degradation due to tourism activities, and this findings reveal that appropriate site-plan design were become fundamental component of sustainable tourism in small island.

Towards sustainable tourism in small island

Small islands are reflecting dynamic entities, continually changing according to environmental conditions. Small island development, therefore,

should be driven in sustainable development vision to achieve economic growth and nature conservation in balance. Some small islands at Kepulauan Seribu has demonstrated long experience as economic machine to generate income through tourism and getting success in the implementation due to its vision to island development.

It is observed in this study that development has been considered tree dimensions to achieve sustainable tourism, encompasses economy, ecosystems and social perspectives (Murphy and Murphy, 2002; Jamienson and Noble, 2005). This perspective widely discussed among scholars and referred as bioregion management approach in order to achieve sustainable development agendas (Heywood and Watson, 1995).

First, in order to enhance economic benefits from tourism in island, a site-plant design and planning allows floating cottages establishment to extent room needs in limited spaces on islands. Its benefits include building strong images as tropical paradise islands and enhancing tourist satisfaction and furthermore improving income earning and sustaining tourist loyalty to the destination. These become significant key success for destination marketing strategy and its competitiveness. Little information available related with local people benefits from tourism because there are no island dwellers. Nevertheless, statistical data shows that the contribution of tourism to the economy in such island were considered important for regional income earning, and plays an important role to initiate the other island development in Kepulauan Seribu chains.

Second, ecosystem consideration has been applied through island site-plan design where native vegetation was conserved, and such situation reveal island's wildlife was conserved. The design also allows a mechanism where visitor density is managed by establishing visitor track corridors. The issues of density were implemented by establishing appropriate destination decision to meet appropriate density for nature-destination. As shown by Baud-Bovi and Lawson (2002), density plays an important role and should be formulated to enhance destination competitiveness. Considering such interviews, simply it is argued that such situation meet to very low density and lead tourism characters to contact with nature (Baud-Bovi and Lawson, 2002). Such design becomes effective mechanism to reduce tourist density in single places and therefore become instrument to reduce severe visitor impact to wildlife, vegetation and heritages of islands (Gunn and Var, 2002).

Third, social aspect of development is conceptualized by involving heritages as one of the tourism attraction at island, and furthermore promoting its existence to reach education, conservation and cultural objectives. According to the Indonesia law, cultural and historical heritages should be conserved to generate numerous benefits derived from its uses through tourism, and therefore become symbol of society and nation identity (Hampton, 2005 Picard, 2006).

Interestingly, the chains of Ayer, Bidadari and Onrust show an excellent bioregional model of development. Simply, social approach were implemented by conserving Onrust as part of social values in system and ecosystem approach by allowing Bidadari as home of island's biodiversity. Furthermore, the economic approach seems to be implemented by driving Ayer as competitive tourism destination to generate income. Generates income from Ayer, furthermore, were used by the government to support heritages and biodiversity conservation programs.

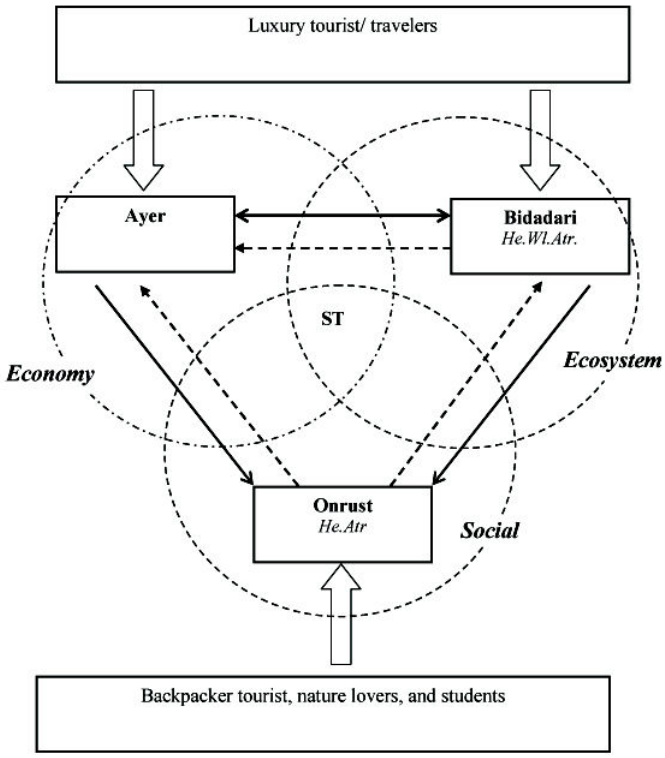

Fig. 3 Schematic diagram of tourist types and its flows related to tourism infrastructures and attractions. This diagram also draws the roles of each island to define bioregional development approach to achieve sustainable tourism (ST). Bold arrows indicate islands contribution to other related tourist arrivals, while dot arrows indicate islands contributions to other related tourism attraction (He.Wl.Atr. is abbreviation of Heritage and Wildlife Attractions, and He.Atr. is Heritage Attraction).

In practices, this simple model is run by the role of tour operator, where they often offering one-day trips to visit these chain islands. This income furthermore used to conserve heritages in Onrust and other islands which have heritage sites and biodiversity conservation program. Through this study, it is clear that chains of Ayer, Bidadari and Onrust are reflecting the ideal bioregional model of development, where its uses seem to meet sustainable scenarios (Fig. 3). While few case were found in tropical countries due to numerous limitation, the complex of Ayer, Bidadari and Ayer become ideal model for bioregion management models.

Conclusion

Tourism is continuously growing, and demands for nature-based tourism increases significantly among world tourist. Natural resources as a fundamental component in this business become interested point to discus among developers and conservationist. Between these two groups which severely competing and often claiming that they are acting the best, tourism has been viewed in different perspectives. In the perspectives of developers, natural resources should be managed to meet economic growth by changing and modifying

natural environment. The other party, environmentalist, often sees tourism as an agent for resources depletion and natural environment degradation. Nevertheless, as many authors argue, there are possibility and opportunity to enhance regional growth from tourism and in the same time ensure biodiversity conservation from tourism benefits. Through the bioregional planning which promotes by world agencies to meet sustainable community, development was driven to meet its balance in order to achieve sustainability.

The concept of bioregional planning for development argues to emphasize integrating economy, ecosystem and social/ cultural dimensions to achieve sustainable development. In the perspectives of developing countries such as Indonesia, few example and information were gained due to lack of studies. Therefore, tourism development in Kepulauan Seribu seems to become significant models of integrating conservation and development among fragile ecosystems such as small island. As far, this study shows that those issues successfully implemented in Ayer, Bidadari and Onrust.

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Appendix I. Tree species of study areas.

Family	Species	Ayer	Bidadri	Onrust
Apocynaceae	*Cerbera odollam* Gaertn.	*		
Anacardiaceae	*Spondias sp*	*		*
	Mangifera indica L		*	
Annonaceae	*Anonna squamosa L*		*	
	Polyalthia longifolia Sonn.		*	
Caesalpiniaceae	*Acacia auriculiformis A.Cunn. ex Benth.*			*
	Acacia sp.		*	*
	Bauhinia blakeana S.T. Dunn		*	
	Cassia siamea Lamk.	*	*	*
	Cassia surattensis Burm.f			
	Delonix regia Raf.	*		*
	Plumeria acuminata L.		*	
	Tamarindus indica L.	*		*
Casuarinaceae	*Casuarina equisetifolia L.*		*	
Combretaceae	*Terminalia catappa* L.	*	*	
Ebenaceae	*Dyospiros celebica* Bakh.		*	
Euphorbiaceae	*Phyllanthus acidus (L.) Skeels*		*	
Lecythidaceae	*Barringtonia asiatica Kurz.*	*	*	*
Malvaceae	*Hibiscus tiliaceus L.*	*	*	
Meliaceae	*Melia azedarach* L.	*		
	Swietenia mahagoni (L.) Jaeg.			*
	Toona sureni (Blume) Merr.	*		
Mimosaceae	*Samanea saman Merr.*			*
Moraceae	*Artocarpus altilis*		*	*
	Artocarpus heterophylla Lamk.			*
	Ficus benjamina L	*		*
	Ficus elastica Roxb.	*		
	Ficus sp.			*
Myrtaceae	*Eugenia aquea* Burm.f.		*	
	Eugenia cumini Druce			*
Palmae	*Cocos nucifera* L.	*		
	Roystonea regia		*	
Papilionaceae	*Erythrina variegata* L.	*		
Rubiaceae	*Morinda citrifolia* L.	*		*
Rhizophoraceae	*Rhizophora* sp.		*	
Sapindaceae	*Erioglossum rubiginosum* Bl.	*		
	Schleichera oleosa Merr.	*	*	
Sapotaceae	*Crysophylum kainito* L.		*	
	Manilkara kauki Dub.	*		
Sterculiaceae	*Sterculia foetida* L.		*	*
Tliaceae	*Muntingia calabura* L.			*

Appendix II. Shrubs and herbs species as ornamental purpose and garden landscaping

Family	Species	Ayer	Bidadari	Onrust	Native/ origins
Agavaceae	*Agave americana* var marginata		*		Mexico
	Agave sisalana Perrine	*	*		Mexico
Amarillidaceae	*Crinum asiaticum* L.	*			Asia, Australia
Apocynaceae	*Allamanda cathartica* L.		*		South America
	Nerium olendaer L.	*	*		Asia
	Adenium obesum Forssk.		*	*	East Africa, Arabia
Araceae	*Aglaonema* spp	*	*		-
	Anthurium spp	*	*		Neotropical
	Philodendron spp	*			-
Araliaceae	*Schefflera* sp.	*			-
Commelinaceae	*Rhoeo discolor* Hance	*			Central America
Cycadaceae	*Cycas rumphii* Mij.	*			-
Dracaenaceae	*Dracaena draco* L.	*	*		Canary Isl.
	Dracaena reflexa Decne.	*	*		Madagascar
	Dracaena deremensis Engl.	*			Africa
Euphorbiaceae	*Codiaeum variegatum* Bl	*			Malesia
	Jatropha pandurifolia Andr.	*			-
Liliaceae	*Cordyline fruticosa* A. Chev	*	*		Western Pacific Ocean and Southeast Asia regions
	Sansevieria trifasciata Prain.	*			Tropical Africa
Palmae	*Mascarena lagenicaulis* L.H.Bailey	*			-
	Rhapis excelsa Thunb.	*			Southern China
	Veitchia merrillii Becc.	*			Philippines
Pandanaceae	*Pandanus tectorius* Park.	*			-
Portulacaceae	*Portulaca oleracea* L.	*			Asia and Africa
Punicaceae	*Punica granatum* L.		*		Iran to the Himalayas
Malvaceae	*Hibiscus rosa-sinensis* L	*			Tropical Asia
Nyctagynaceae	*Bougainvillea spectabilis* Willd.	*	*		Brazilia
Rubiaceae	*Ixora paludosa* Kurz.	*			-
Verbenaceae	*Lantana camara* L.	*	*		Tropical America