



Filipa Benvinda Ramos Gomes

**COMMUNITY BASED ECOTOURISM AS A NATURE  
CONSERVANCY TOOL - A PERMACULTURAL PERSPECTIVE**

**KIULU FARMSTAY STUDY CASE**

**ENVIRONMENTAL EDUCATION PROGRAM FOR KIULU COMMUNITIES**

**Jury:**

President: Doctor Professor Sara Proença

Arguendo: Doctor Professor Isabel Dinis

Advisor: Adjunct Professor Pedro Bingre do Amaral

Coimbra, 2017



Filipa Benvinda Ramos Gomes

**COMMUNITY BASED ECOTOURISM AS A NATURE  
CONSERVANCY TOOL - A PERMACULTURAL PERSPECTIVE**

**KIULU FARMSTAY STUDY CASE**

**ENVIRONMENTAL EDUCATION PROGRAM FOR KIULU COMMUNITIES**

**Jury:**

President: Doctor Professor Sara Proença

Arguendo: Doctor Professor Isabel Dinis

Advisor: Adjunct Professor Pedro Bingre do Amaral

Professional Internship Report presented to Escola Superior Agrária de Coimbra to  
fulfill the necessary requirements to obtain a degree of Master in Ecotourism

Coimbra, 2017

A ti Mãe Terra, pelo inexplicável.

To you Mother Earth, for the inexplicable.

"Centuries were needed to know a part of the laws  
of nature. A day is enough for the wise man  
to know the duties of man."

Voltaire

"Though the problems of the world are increasingly complex,  
the solutions remain embarrassingly simple."

Bill Mollison, permaculture co-founder

## **Acknowledgments**

First of all, I would like to thank to Borneo Eco Tours and BEST Society for accepting me as an intern and for its total support on my proposal to Kiulu. Then, I must thank to all the hosts in Kiulu, who so well received me: Mr. Ben and Mrs. Nuria, Mr. Jumadi and Mrs. Ester, Mr. Feridin and Mrs. Diana, Mr. Saidin and Mrs. Jovita, Mr Martin and Mrs. Rosena, Mr. Paladius and Mrs. Felixcia, Mr. James and Mrs. Salahoi, and all their relatives. They showed me true hospitality and I couldn't have been better treated. Their full transparency during interviewing time deserves my deepest acknowledgment. Special thanks to Cathy for being my interpreter, translating my speech to Malay whenever needed.

Also, I would like to thank to all Borneo Eco Tours staff for supplying me the requested data under this report topic, particularly to Nancy, Rosa and Kelwin.

Thank you Yuko for believing and put trust on me.

Thank you Mr. Teo for being the mentor and booster of such great projects.

Thank you Leanne for all I couldn't mention, because is too much. But most of all, thank you for being my friend.

To all my master's teachers in Coimbra, many thanks for sharing your knowledge and for an interesting and challenging year. Professor Pedro, thank you for your patience and guidance.

## **Abstract**

The world is facing a new transition. Environmental impacts are on the order of the day and its consequences are no longer a far distant prediction. The United Nations with the cooperation of governments, organizations, private companies and individuals are already making the effort to urge environmental protection and nature conservancy, intervening in different sectors. Tourism is not an exception and especially this year an important boost is being given with the announcement of the 2017-International Year of Sustainable Tourism Development from UNWTO. Representing 10% of the world's GDP and 30% of services exports (UNWTO, 2016), tourism is one of the biggest world industries and creates a huge impact on environment, which can be very positive or extremely negative depending on the way it's managed.

Gladly, the growing awareness and concern about Man's environmental impacts on planet earth has created a global trend where concepts as sustainability, local economy, resilience, organic farming, permaculture, self-sufficiency, clean energy, renewable resources and 3 R's (Reduce, Reuse, Recycle) have become popular and every day better and renewed solutions arise.

Connecting sustainable practices with a newly born Community-Based Ecotourism (CBET) project in Malaysian Borneo, a program was developed with the attempt to improve both, nature and human life, creating a crescent environmental awareness among local communities in Kiulu and proving that CBET can act as a nature conservancy tool when, through capacity building, a business opportunity is given to empower remote rural areas with decaying livelihoods.

**Key-words:** Community Based Ecotourism, Kiulu Farmstay, Perma

## Table of contents

Acknowledgments .....	IV
Abstract.....	V
List of tables.....	VIII
List of figures.....	VIII
List of acronyms.....	X
Introduction.....	1
Theme justification .....	1
Project goals and key questions .....	2
Report structure.....	3
CHAPTER 1: Theoretical framework .....	3
1.1 Malaysian Borneo – Sabah State .....	3
1.1.1 Territory brief characterization .....	3
1.1.2 Population and socio-economic aspects.....	5
1.1.3 Tourism offer.....	5
1.1.4 Tourism evolution .....	9
1.2 Biodiversity, livelihoods and tourism linkage in Sabah.....	12
1.2.1 Biodiversity hotspot .....	12
1.2.2 Environmental issues .....	14
1.2.3 Ecotourism approach.....	16
1.3 Community Based Ecotourism theoretical outline .....	17
1.3.1 Concept definition .....	17
1.3.2 Capacity building and environmental education .....	19
1.3.3 CBET as a nature conservancy tool.....	19
1.4 Permaculture overview .....	20
1.4.1 Ethics .....	21
1.4.2 Principles.....	21
1.4.3 Fields of intervention .....	22
1.4.4 Permaculture as a tourism product.....	24
CHAPTER 2: Kiulu Farmstay study case .....	25
2.1 Methodology .....	25
2.2 Market analysis .....	26

2.2.1 Supply.....	26
2.2.2 Demand .....	30
2.2.3 Annual growth.....	34
2.2.4 Estimation of market needs.....	36
2.3 Strategic framework .....	37
2.3.1 Mission and positioning statement.....	37
2.3.2 SWOT analysis .....	37
2.3.3 Goals .....	39
2.4 Homestay experience .....	39
2.5 Community consultation: results analysis .....	44
2.6 Enironmental education program .....	48
2.6.1 Event n. ° 1 .....	48
2.6.2 Event n. ° 2 .....	57
2.6.3 Event n. ° 3 .....	58
2.7 Additional achievments.....	58
2.8 Proposals .....	60
Discussion.....	62
Conclusion.....	64
Links.....	65
References .....	66
Appendix .....	73

## **List of tables**

Table 1 – Quad Bike experience comparison (tourist testimony)

Table 2 –Demographic profiles of international visitors (2016)

Table 3 – Countries of origin of international visitors (2016)

Table 4 - Kiulu Farmstay SWOT Analysis

Table 5 - List of tourist activities

Table 6 - List of appropriate material for compost

Table 7 - List of allowed and forbidden waste in a compost pile

Table 8 – Homestay personal evaluation (1 to 5 stars)

Table 9 – Personal schedule: Homestay experience

Table 10 – Homestay families' questionnaire

Table 11 – Problems, causes and solutions in domestic compost

Table 12 - Evaluation form

## **List of figures**

Figure 1 – Map of Borneo

Figure 2 – Eco-Adventure Destinations in Sabah

Figure 3 – Sabah's travel map

Figure 4 – Employed persons by industry, Sabah



Figure 5 - Sabah visitor arrivals 2002 – 2016

Figure 6 - Purpose of Sabah's visitors

Figure 7 - Biodiversity hotspots (2005)

Figure 8 – CBET pillars for sustainable development

Figure 9 - Permaculture principles

Figure 10 – Permaculture flower

Figure 11 - BQB monthly tourists (Jan. - Dec. 2016)

Figure 12 - FT monthly tourists (Jan. - Dec. 2016)

Figure 13 - Homestay monthly tourists (Jan. – Dec. 2016)

Figure 14 - BQB tourists by nationality (Jan. - Dec. 2016)

Figure 15 - FT tourists by nationality (Jan. - Dec. 2016)

Figure 16 - Homestay tourists by nationality (Jan. – Dec. 2016)

Figure 17 – Host family welcoming

Figure 18 – *Sinuripan* waterfall (Tulung village)

Figure 19 – *Kg. Mantob* paddy field

Figure 20 – Durian tree planting

Figure 21 – Jungle food show cooking

Figure 22 – *Kadazandusun* celebration

Figure 23 – Hill paddy with corn consociation

Figure 24 – New water collector (*Kg. Mantob*)

Figure 25 – Compost essential elements

Figure 26, 27, 28, 29 and 30 – Shapes of composting

Figure 31 – Compost cycle

Figure 32 – Multicrop Banana Circle example and measures

Figure 33 – Greywater natural system

Figure 34, 35, 36, 37, 38 and 39 – Contest participants

## **List of acronyms**

BEST Society – Borneo Ecotourism Solutions & Technologies Society

BET – Borneo Eco Tours

BIMP-EAGA – Brunei, Indonesia, Malaysia and Philippines – East Asian Growth Area

BQB – Borneo Quad Biking

CBET – Community Based Eco Tourism

DSM – Department of Statistics Malaysia

FIT – Foreign Independent Tour

FT – Fig Tree

GDP – Gross Domestic Product

KF – Kiulu Farmstay

MEA - Millennium Ecosystem Assessment

MICE – Meetings, Incentives, Conferences and Exhibitions

MUKEST - Mukim Ulu Ecotourism Solutions and Technologies

NGO – Non-Governmental Organization

SRI – System of Rice Intensification

TIA - Travel Industry Association of America

TIES – The International Ecotourism Society

UNEP - United Nations Environment Programme

UNWTO – United Nations World Tourism Organization

WWF – World Wildlife Fund

## **Introduction**

A lot has changed on planet earth since human life arose. When Man altered his hunter-collector behavior to a sedentary living sustained by agricultural development, landscapes started to be modified and shaped according to human necessity. With an exponential population growth and an emergence of technology, industrial revolution happened, transforming natural resources in complex materials much harder to break down through the natural cycle of biodegradation. Now, with over 7.4 billion people in the world (Kaneda, 2016) and a high consumerism level of non-degradable disposable materials, the world is facing enormous negative impacts on life, where soil, water and air quality are compromised and, consequently, entire ecosystems are damaged and degraded, affecting humans, animals and plants.

Malaysian Borneo is located in Southeast Asia and, like many others places in the planet, has and is suffering great environmental impacts caused by human activity. This report lists its main issues and faces on practice a rural remote area of Kiulu, in Sabah state.

Kiulu has, in its majority, villages surviving over rubber extraction and rural farming. Both of this economies are decaying and the populations are increasingly earning less for their livelihoods. In other hand, tourism in Sabah is growing, becoming an alternative economy with great potential.

### **Theme justification**

This internship was accomplished in cooperation with an ecotourism tour operator – Borneo Eco Tours – its NGO - BEST Society – and a local organization from 13 Kiulu communities - MUKEST. It focused in a newly born capacity building project in Kiulu, entitled Kiulu Farmstay and defined as Community-Based Ecotourism (CBET).

As an individual project, an environmental education program was developed considering the main issues identified with a prior need of intervention: waste management, greywater treatment and environmental awareness. Based on a background in permaculture, some of its methods were used to implement sustainable

and self-sufficient practices, using natural techniques with a very low budget: composting and banana circle.

It is believed that when the opportunity to enter an ecotourism entrepreneurship is given, local communities strengthen their predisposition to alter old environmentally unfriendly habits, in order to meet the demand. Thus, the idea of the environmental education program came in an attempt to improve nature preservation in Kiulu area and to show that CBET can change locals' behavior towards nature conservancy and sustainable development.

Therefore, this study focused on assessment of community participation to bring sustainable local development in Kiulu and improve its natural environs.

### **Project goals and key questions**

In a general perspective, it was first aimed to identify Sabah's environmental issues, its cause and how is it affecting the territory, crossing it with the tourism industry. Secondly, the goal was to deepen this understanding on a local basis, where the project was desired to be developed: Kiulu. What were their day-to-day habits and how was this reflected on life and environment quality.

After this, the goal was to develop an environmental education program through a permacultural perspective, showing sustainable alternatives for local development: organic farming benefits, natural techniques for waste and water management, wildlife conservation and environmental quality preservation.

By this, it was intended to create environmental awareness in Kiulu's community and improve Kiulu Farmstay offer through a stakeholders training (local and corporate), crossing the permaculture concept with CBET. Basically, understand how permaculture practice can influence the tourism market and protect nature at the same time.

Concluding, the main goal was to use a capacity building project sustained by tourism (Kiulu Farmstay) as a nature conservancy booster, proving that it can happen easily when a business opportunity is sighted through the ecotourism market.

## **Report structure**

It's first presented a literature review about the territory where the internship took place and an approach to all the concepts subject of this report's theme, crossing it with recent tourism data in Sabah's state.

Then, the study case is scrutinized according to a specific methodology, presenting the research upon the location and the involved stakeholders, followed by a tourism market analysis and a strategic framework definition for the project in its entirety.

Lastly, there's a description of the achieved environmental education program, discussing its impacts on local stakeholders and the results that allowed to conclude about the report's theme.

## **CHAPTER 1: Theoretical framework**

### **1.1 Malaysian Borneo – Sabah State**

#### **1.1.1 Territory brief characterization**

Borneo, located in the equatorial region of the Pacific Ocean, is the third largest island in the world with nearly 740 000 km<sup>2</sup> and it's occupied for three different countries – Brunei Darussalam, Indonesia and Malaysia. The Malaysian region of Borneo is divided into two states, Sarawak and Sabah (WWF, 2007). Being the second largest of the thirteen states in Malaysia, with a population of over 3 million people (Fabeil, 2013), Sabah straddles the northern tip of this island (figure 1) and has a heavily indented coastline of approximately 800-900 miles washed by the South China Sea to the west, the Sulu Sea to the north and the Celebes see to the east (Isley *et al.*, 2013).

**Figure 1 – Map of Borneo**



Source: Wikipedia – Borneo

By land, Sabah is bordered by Sarawak on its southwestern side, and Kalimantan (Indonesian Borneo) to the south. Sabah is generally mountainous, with the central mountain ranging from about 3000 feet to about 9000 feet in height, with lower ranges of hills near the coasts. These mountains and hills are dissected by an extensive network of river valleys with occasional plains. Over three quarters of the population inhabit the coastal plains. The climate of Sabah is of course tropical but on the whole equable. Temperatures rarely rise above 32 C (90F) except on extremely hot days, and along the coastal areas rarely drop below 20 C (68F) at night. However in the interior and at higher altitudes it can get quite cold at night (Teo, 2011).

The annual rainfall varies from about 150cm (60 inches) to over 450cm (180 inches) per year. In most parts of Sabah the wetter period occurs during the North-East monsoon from October to February and the drier season during the South-West monsoon from March to September but often there is no really sharp division between the two. It is enough to say that on the whole, sunny blue skies are the norm but when it

rains, the heavens open. Sabah lies just south of the typhoon belt (thus its name ‘Land below the wind’) and outside of the Pacific earthquake rim (Teo, 2011).

### **1.1.2 Population and socio-economic aspects**

Possibly as long as 5000 years ago Sabah was settled by Mongoloid-type people. The largest indigenous group in Sabah is the *Kadazandusun* group. Within this group there exists at least ten distinct languages and possibly 30 or more dialects. They are traditional farmers occupying the fertile plains of the west coast and the interior (Teo, 2011). Their main occupation and income comes from rice, palm oil, rubber, fruit and vegetables crops.

About half of the population (50,5%) lives in rural areas, with almost equal proportion of males and females (Fabeil, 2013). A typical traditional family within this areas has, in average, 3 to 5 children and most of women are housewives and farmers. Even so, as it will be demonstrated below, tourism has grown rapidly, represening a new livelihood for this population.

### **1.1.3 Tourism offer**

Sabah, with its ancient rainforests, rugged, granite-peaked mountains, idyllic lagoons and pristine beaches, it encapsulates the very best of the ancient island (Isley *et al.*, 2013). It’s endowed with rich natural resources, culture and heritage, which are already well known among discerning travelers. Sabah’s increasing international connectivity is also contributing to the growing number of foreign arrivals (Badawi, 2008).

The capital of Sabah, Kota Kinabalu, is conveniently situated at the heart of South East Asia. It is 1961 km from Hong Kong, 1143 km from Manila, 1495 km from Singapore, 1678 km from Kuala Lumpur and 2291 km from Taipei (Teo, 2011).

Sabah positions itself as a Premier Eco-Adventure Destination, where the combination of mountains, coral reefs, beaches, rainforest and wildlife (figure 2) is a strong differentiator in comparison to other more developed and well-known eco-tourism destinations in the region, such as Indonesia and Thailand (Badawi, 2008).



**Figure 2 – Eco-Adventure Destinations in Sabah**



Source: Sabah Tourism

### **a) Natural Resources**

Sabah is rich in biodiversity, contributing significantly to Malaysia being one of the 12 mega biodiversity hotspots in the world (CEMD, 2006). It's home to many nature and wildlife conservation areas and parks, including South East Asia's highest peak Mount Kinabalu. It also boasts an abundance of tropical rainforest and wildlife such as the protected orangutan, as well as pristine beaches and diving sites. Its natural endowments provide the perfect destination for nature-inspired and adventure seeking travellers.

Major nature and adventure-based attractions include:

- Nature and Wildlife:
  - UNESCO World Heritage Site: Mount Kinabalu, Sipadan Island, Maliau Basin, and Tun Sakaran Park;
  - Kinabalu Park / Poring Hot Springs;
  - Tunku Abdul Rahman Park;

- Sepilok Orang Utan Sanctuary and Rehabilitation Centre;
  - Danum Valley Conservation Area;
  - Tabin Wildlife Reserve;
  - Selingan Turtle Islands Park;
  - Gomantong Caves;
  - Lower Kinabatangan Wildlife Sanctuary (Corridor of Life).
- Adventure:
- Diving: Sipadan Island, Langkayan, Kapalai, Mantanani;
  - Mountaineering and trekking: Mount Kinabalu, Crocker Range Park, Mount Trusmadi, Maliau Basin;
  - Whitewater rafting: Padas River and Kiulu River;
  - Off-road 4x4 safari driving.

## **b) Culture and Heritage**

Sabah with its myriad of ethnic cultures offers diverse experiences for the culture-seeking traveler. There are more than 32 different indigenous groups in Sabah with each tribe generally unique to a particular district, lending to a distinctive way of village living, music, dance and festivals, as well as unique handicrafts. Major cultural attractions include:

- Sabah Museum;
- Tingkayu Archeological Sites;
- Rungus Longhouse at Kampung Bavanggazo, Matunggong;
- Water Village at Mengkabong, Tuaran;

- Pesta Kaamatan or Harvest Festival;
- Lepa-Lepa Regatta at Semporna;
- Murut Cultural Centre at Tenom;
- Handicrafts.

There is great demand for local handicrafts and souvenirs among tourists in Sabah. A survey conducted by the Sabah Tourism Board revealed that an average of 7%-10% of tourist expenditure is on handicraft (Badawi, 2008). Handicraft production is already an active tradition among many of Sabah's natives – *Kadazandusun*, *Murut*, *Bajau*, *Rungus*, *Lundayeh* and *Melayu Brunei* – and can be a good income source for these communities.

Considering the wide range of natural, cultural and heritage resources (figure 3), the friendly people of Sabah provide a pool of services for the tourism and hospitality industry.

**Figure 3 – Sabah's travel map**



### **c) Geographic Location and Connectivity**

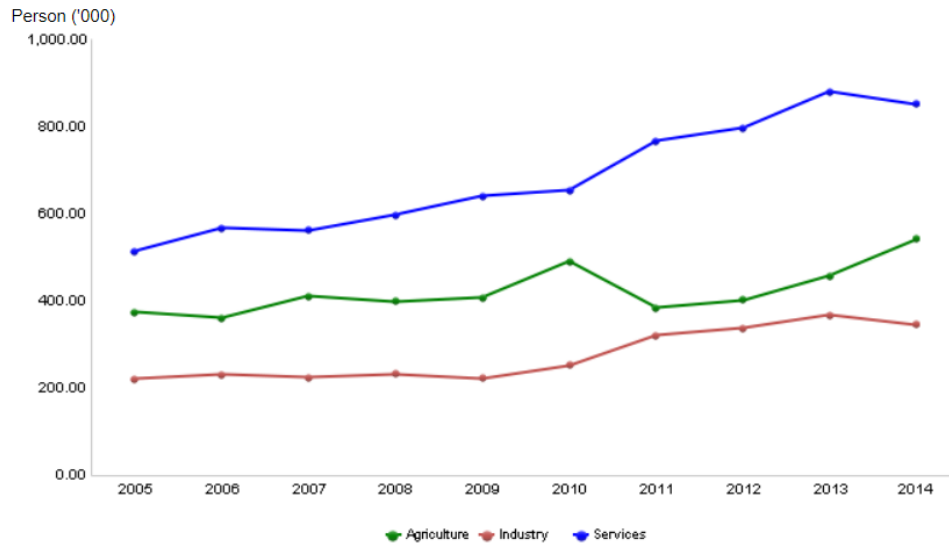
Sabah is strategically located in the northeast corner of Borneo, with approximately 77.1 million and 139.4 million potential tourists within a 3-hour and 6-hour flight radius respectively. Sabah also has the potential to tap into the 34.5 million international visitor arrivals at the region's major aviation hubs – Kuala Lumpur, Hong Kong, Singapore and Bangkok (UNWTO, 2015).

According to the World Tourism Organization, modern travelers want 'activity-based' attractions as opposed to 'destination' travel. Sabah is already a destination for nature, cultural and activity-based tourism, and has tremendous potential to grow by leveraging on its appeal as an ecological and adventure wonderland.

#### **1.1.4 Tourism evolution**

The services sector is a major contributor to Sabah's GDP. Its share in 2015 represented 40.5%, of which 34.8% corresponded to tourism services. Comparing to the total GDP of 2015, the tourism sector represents 14.1% of its entirety (DSM, 2016). The services industry also provides the highest number of jobs (figure 4): 852,300 persons were employed in the services sector in 2014, which accounted for 49.0% of total employment in Sabah (DSM, 2016). Tourism is envisaged to be the key driver for the services sector in Sabah. It's an important economic driver and the third highest contributor to Sabah's economy after agriculture and manufacturing (Badawi, 2008).

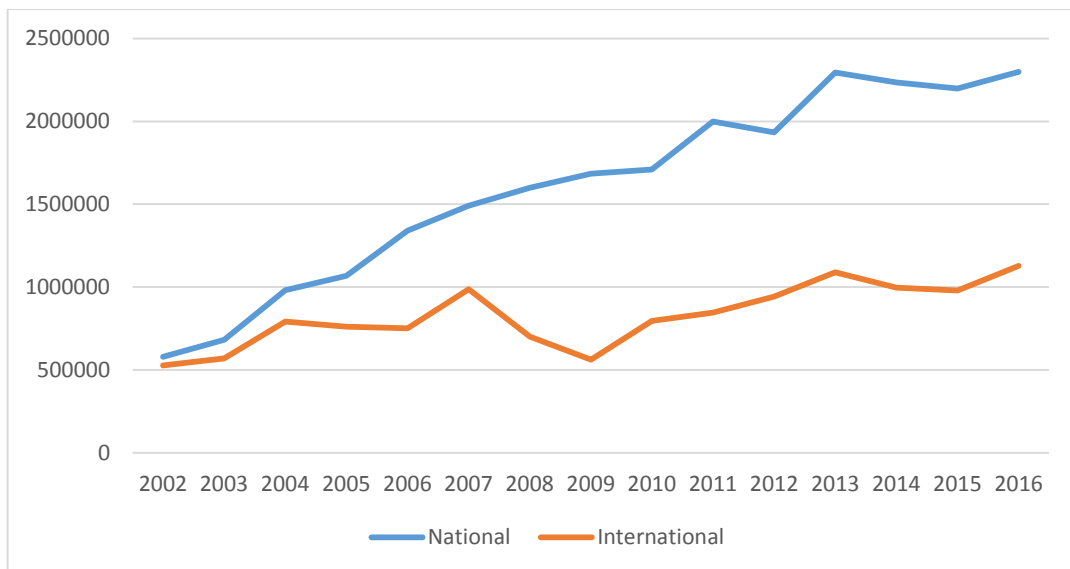
**Figure 4** – Employed persons by industry, Sabah (2005-2014)



Source: DMS

Looking at the chart below (figure 5), it can be seen that in a decade (2002-2012), the touristic growth was incredibly fast, especially for domestic tourism, which passed from five hundred thousand visitors a year to two millions.

**Figure 5 - Sabah visitor arrivals 2002 – 2016**



Data original source: MASB, Sabah / Immigration Dept, Sabah/Air Asia

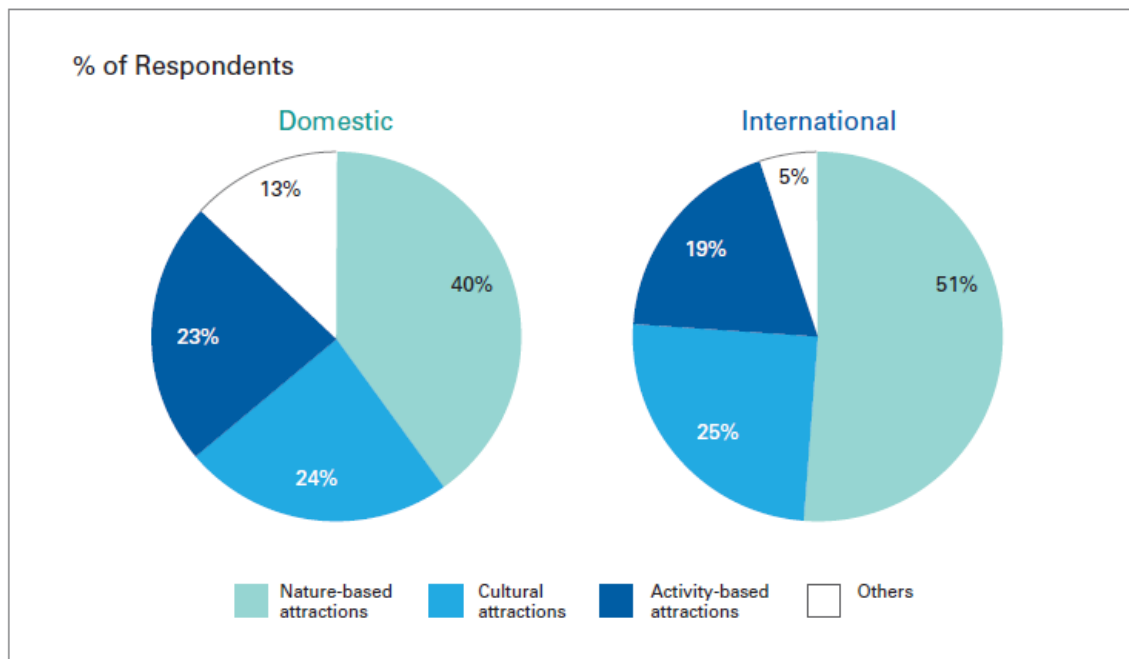
Website data source: Sabah Tourism

The last two years (2014 and 2015) a slight decadence happened, being verified a larger decrease of international arrivals (8.5% in 2014 and 1.8% in 2015). The domestic visitor arrivals had a minor decrease (2.6% in 2014 and 1.6% in 2015), not so relevant in comparison to the total number of national arrivals. Even so, the data from 2016 shows an inverse trend, with a considerable growth of international visitor arrivals (15.4%) and the same for domestic visitor arrivals, even though minor than the first one (4.6%).

In general, international tourists spend twice as much as domestic tourists. Main expenditure components are shopping, food and beverages, accommodation, entertainment and recreation. Average length of stay of domestic and international visitors is 3 nights and 8.2 nights respectively (Badawi, 2008).

Considering the tourism offer previously presented, is easily understandable why most of tourists choose Sabah for nature-based activities. Though, as it shown below (figure 6), cultural attractions and activity-based attractions also have a big share on tourists preferences.

**Figure 6 - Purpose of Sabah’s visitors**



Source: Tourist Expenditure Survey, Sabah Tourism Board (September 2004)

The World Tourism Organization predicts that the trendiest destinations in the future will be the tops of the highest mountains, the depths of the deepest oceans and the ends of the earth. Therefore, conservation and conscientious tourism are important to ensure sustainability. With the increasing environmental sensitivities and greater awareness among discerning travellers, ecotourism has become the fastest growing segment in the tourism industry. It is estimated to be increasing 20% annually compared with 7% for tourism overall (TIES, 2006).

Concerns about the environmental, socio-cultural, and economic impacts of travel and tourism have increased in recent years. People express a preference for unique and culturally authentic travel experiences that protect and preserve the ecological and cultural environment and say they would pay more to use travel companies that strive to protect and preserve the environment (TIA, 2003).

## **1.2 Biodiversity, livelihoods and tourism linkage in Sabah**

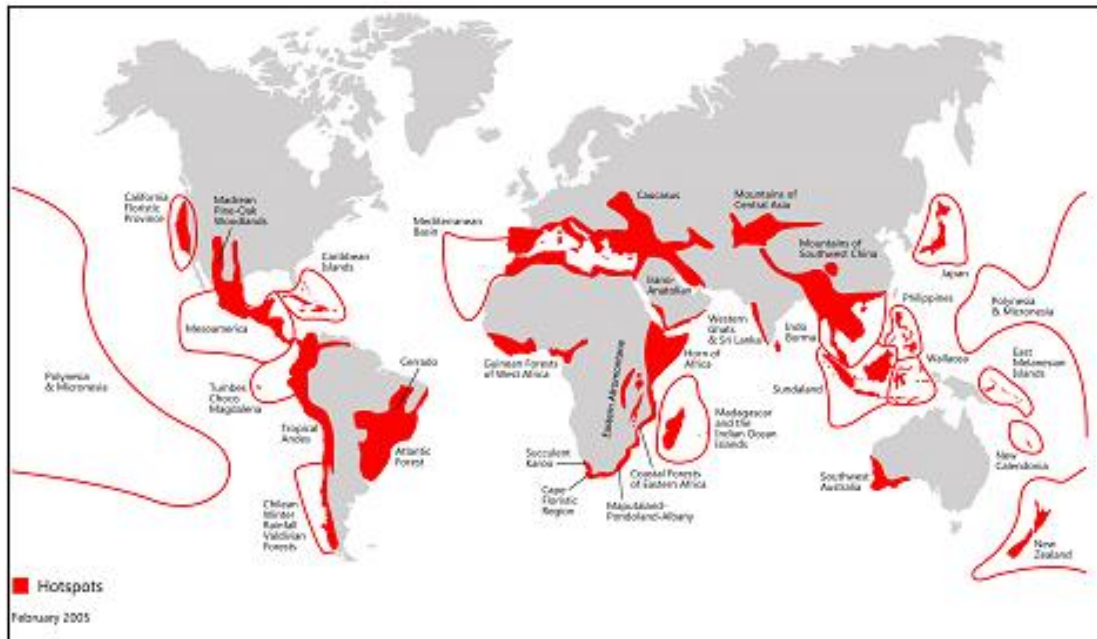
Biodiversity is essential to human development because of the goods and services it provides. An estimated 40% of the global economy is based on biological products and processes. However, on a global scale, biodiversity is being lost at a rate many times higher than that of natural extinction (Christ *et al.*, 2003).

### **1.2.1 Biodiversity hotspot**

Hotspots are regions that harbor a great diversity of endemic species and, at the same time, have been significantly impacted and altered by human activities. Plant diversity is the biological basis for hotspot designation—to qualify as a biodiversity hotspot, a region must support at least 1,500 endemic plant species (0.5 percent of the global total). Existing primary vegetation is the basis for assessing human impact in a region, and a hotspot must have lost 70 percent or more of its original habitat. (Meyers *et al.*, 2000).

To determine priority areas where biodiversity loss is a serious concern, Conservation International has identified a series of biodiversity “hotspots” (figure 7). These hotspots represent areas for urgent conservation action on a global scale. They are also useful for looking at the impact of tourism on biodiversity (Christ *et al.*, 2003).

**Figure 7 - Biodiversity hotspots (2005)**



Source: Conservation International

From the figure above it is seen that the whole Borneo is considered a hotspot. As it was mentioned before, Borneo is the third largest island in the world, of which Sabah is part and has been frequently acknowledged as one of the most important centres of plant diversity in the world due to its location and consequent biome. Tropical rainforests and deciduous forests, coral reefs, large tropical lakes and the deep see hold most of the world's biodiversity (MEA, 2005). Also, tropical forests occupy only 7% of the world's land area, but contains more than 50% of the world's species (Corlett and Primack, 2010).

This island, is conservatively, estimated to harbour 10,000-12,000 species of flowering plants, representing about 5-6% of the world total (Mat-Salleh and Beaman, 1992). Of these, 40-50% are endemic to the island, and up to 80% of the endemic species in Borneo occur in Sabah and Sarawak (Kiew, 1984).

Thus, Borneo is one of the world's most important biodiversity centres and contains a wide variety of forest habitats, including mangroves, peat swamps and freshwater swamp forests, mixed dipterocarp forests, montane forests and forests on limestone and ultrabasic soils. Borneo has some of the highest levels of plant diversity



on Earth, with approximately 15,000 plant species, of which 6,000 are endemic (WWF, 2007).

In addition to orang utans, elephants and rhinos, Borneo also houses lesser-known species such as the sun bear, banteng (wild ox) and endemic Bornean gibbons. Surveys conducted throughout the area have established that there are well over 200 bird species, approximately 150 reptiles and amphibian species, and almost 100 mammal species. New species are constantly being found. Between 1994 and 2004, at least 361 new species have been identified in Borneo (WWF, 2007).

Though, being Borneo identified as a biodiversity hotspot, it means that at least 70% of its habitat is already lost and most of its endemic species are on the verge of extinction. For that reason, the negative human impacts that are causing this loss must be identified and reversed.

### **1.2.2 Environmental issues**

Through the processes of selective logging and agricultural conversion, large areas of tropical forests are being degraded and fragmented worldwide (Blaser *et al.*, 2011). South East Asia has the highest rate of lowland forest loss of any tropical region, with logging and deforestation for conversion to plantation agriculture being flagged as the most urgent threats (Sodhi *et al.*, 2004). The standardized annual rate of deforestation for the whole of Borneo (2007-2012) was 4.68%. Industrial conversion of forests into oil palm and timber plantations is the major driver of deforestation.

Malaysia is an emerging economy characterized by unprecedented economic growth and booming large-scale palm oil agriculture and commercial exploitation causing deforestation and biodiversity loss (Nagle, 2009). Most of the historical lowland forest of Sabah was converted before 2007, mainly into plantations. In 2013 only a few areas of lowland forest remain, and many of these are fragmented. Forest fires are serious threats to the remaining upland forests and occurred up to 2012. Sabah is the only state or province of Borneo where considerable areas of montane forests have been converted. Slopes of the Kinabalu and Crocker range mountains were converted for agriculture mainly before 2007, but the process continued until 2010 (Wulffraat, 2014).

Sabah's biodiversity policy is considered more ambitious than national policy; however, the state government has simultaneously pushed timber extraction, premature re-logging and forest conversion to maximize legal and illegal timber and palm oil revenues. Almost all licensed forest has been logged to near exhaustion and timber production declined by over 95% from the 1970s. Much selectively logged land has been clear-cut and converted to palm oil plantations, leaving vast areas damaged (Reynolds *et al.*, 2011).

Government regulation is insufficient; implementation and monitoring largely lacking. Sabah's forests are managed by the Sabah Forestry Department. Approximately 1,000,000 ha are concessioned out to Yayasan Sabah (Sabah Foundation) to finance poverty alleviation programmes and scholarships for Sabahans. (Brock, 2015). The forestry department reclassified protected areas as production forest, and allegedly even slopes as non-slopes, for additional logging (SarawakReport, 2012). Palm oil agriculture occupies 87% of all cultivated land – at least 80% of that area directly replaced natural forest (Toh and Grace, 2006). Rubber trees plantations also represent one of Sabah's economies, being possible to see all over, extensive monocultural areas of this trees.

Detecting and mapping logging impacts on forest structure is a primary conservation concern, as these impacts feed through to changes in biodiversity and ecosystem functions (Pfeifer *et al.*, 2015), provoking deforestation, habitat fragmentation, soil erosion and desertification, lack of water, oceans degradation, climate change, biodiversity loss and species extinction.

Also, corporations are criticized for water and air pollution (through fertiliser runoff and mills, resulting in decreasing fish stocks, flooding and degradation), infringement on indigenous rights (expansion into local land), and exploitation and abuse of its (foreign) workers (Norwana *et al.*, 2011).

Furthermore, waste management represent a serious environmental threat. There's a very poor system of garbage collection and recycling is almost inexistent, which leads to another serious issue: littering. Discharges to rivers, ocean and soil are a common practice, either in the cities or villages. On rural villages is a normal and

accepted practice to burn plastic, bury glass or just leave any kind of disposable material around the road sides, backyards or gardens.

Summarizing, logging, agriculture, pollution, forest fires, illegal poaching, waste management and the lack of environmental awareness are the main threats to Sabah's biodiversity and environmental health. Seeing this as sad fact that makes of Borneo a biodiversity hotspot, for its loss, it's urgent to reverse this situation and preserve one of the most unique and richest spots in the world. Tourism, as a growing industry, can be one of the pro-factors in this change, as it will be discussed further on.

### **1.2.3 Ecotourism approach**

Tourism is a global industry with a bearing on the lives of millions of people, whether it is positive or negative. Mass tourism is a form of tourism that dominated the industry previously and its development showed a lack of consideration with regards to the limitations of natural resources, impact on wildlife, threat to the various cultural identities, and neglect of the environment, social development and participation of local communities in decision making for natural conservation (Risteski *et al.*, 2012). Developing a tourism industry has both benefits and costs. However, if these impacts are understood from the views of tourism stakeholders, strengths and opportunities can be maximised while weaknesses and threats can be minimised. According to United Nations (2003), each destination will be different in terms of tourism characteristics. Thus each destination may have a particular list of indicators to evaluate the sustainability level in order to achieve the three principle outcomes of sustainable tourism development: economic growth, environmental integrity and social justice (Jaini *et al.*, 2012).

With a growing interest to spend leisure time in nature and increasing awareness of environmentalism, ecotourism has become one of the fastest-growing segments of the tourism industry and its potential as a tool for development is enormous (UNEP, 2001). Compared with mass or 'old' tourism, ecotourism is touted as providing better sectoral linkages, reducing leakage of benefits out of the country, creating local employment, and fostering sustainable development (Belsky, 1999; Khan, 1997). Thus, it has been popularly promoted as a mean of reconciling wildlife conservation with economic development, particularly in developing countries (Campbell, 2002).

Ecotourism is characterised by its natural attractions, wildlife and wilderness habitats. Many countries favour ecotourism as a form of economic development as it is perceived as a low impact form of tourism. Ecotourism operations are generally small-scale, so are relatively easy to set up. Carefully planned and operated ecotourism sites, especially if it is village-based and includes local participation, is able to provide direct benefits that might offset pressure from other less sustainable activities that make use of natural and cultural resources (Bagul, 2009).

Turning this to an even more specific approach in order to show a true intention for local empowerment and capacity building, the concept of Community Based Ecotourism is adopted.

### **1.3 Community Based Ecotourism theoretical outline**

#### **1.3.1 Concept definition**

Community-based ecotourism is a form of alternative tourism activity which emphasizes the development of local communities and allows them to have substantial control over, to get involved in its development and management, and a major proportion of the benefits remain within the community (WWF, 2001).

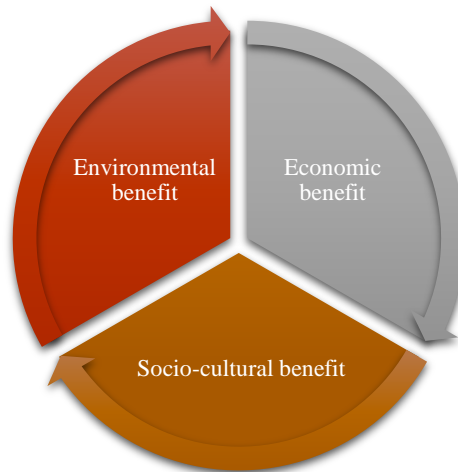
What makes CBET distinct from CBT is that CBET persistently reiterates the preservation of the ecological surrounding with the ideology of ecotourism: educational-based, nature-based, and sustainable-based (Weaver, 2002), while the sociocultural perspective is still promoted.

Due to its nature, CBET brings the customer to the product itself. It ensures the involvement of local communities and provides considerable opportunities for contacts and linkages with the tourist. Besides, community-based ecotourism can pursue the local communities through different activities such as, cultural show, souvenir selling, guiding tourists, general merchants, and conservation of environment and their cultural assets (Aseres, 2015).

CBET seeks to create an equilibrium between conservation and local community livelihoods, conserving biodiversity simultaneously dropping rural poverty and accomplishing both goal on a realistic basis (Khanal and Babar, 2007). It encompasses

three major laws of sustainable development (figure 8) i.e. economic efficiency, social value and environmental sustainability (Mbaiwa, 2004).

**Figure 8** – CBET pillars for sustainable development



Economic efficiency ensures people have access and enjoy high standards of living and that benefits are shared equally among all people involved in the activity. Social equity means all the participating user groups of CBET must have equal and just opportunities and access to resources as well as a fair share of revenues, right to participate in the decision-making process and administration related to tourism activity. All members of a community involved in CBET must benefit from the project. Ecological sustainability confirms natural resource preservation and respects the host community. CBET ensures the community's' empowerment and ownership, conservation of natural and cultural resources, socioeconomic development and quality visitor experience (Hiwasaki, 2006). These factors will motivate the local community to participate in CBET. Sustainable tourism directs to the management of all resources in a way that economic, social and aesthetic needs can be fulfilled while upholding cultural integrity, essential ecological developments, natural diversity and life support scheme (Muhanna, 2006). Sole reasons for the development of community are to provide them with the essential wherewithal to improve their living conditions, to conserve their natural and cultural heritage and to offer monetary prospects (Bhatta, 2008).

### **1.3.2 Capacity building and environmental education**

The basic reason for community development is to provide communities the necessary resources to enhance their livelihood, to protect their natural and cultural heritages and to provide economic opportunity as well. CBET can also promote social development and environmental health to the community through sustainable economic growth. Research conducted in the case of Puerto Princesa, Palawan Island found in Philippines showed that CBET can bring numerous socio-economic benefits to the Islanders in terms of generating foreign exchange, creating local employment, stimulating national and local economies, fostering international peace, and increasing environmental awareness and education (Andrade, 2008).

Wanga *et al.* (2013) found an association between residents' environmental knowledge and their attitudes towards ecotourism. Participation of local communities in ecotourism can be motivated by having suitable management strategies that target improving local understanding of the environmental issues, stimulating favorable attitudes towards ecotourism and developing environmental plans (Zhang and Lei, 2012).

The lack of information about environmental problems has adverse impacts on local environmental behavior. Environmental knowledge is an important variable that affects the level of environmental engagement (Barr and Gilg, 2007). One of the greatest contentions towards getting the best type of natural activity is through knowledge. People with information, abilities and qualities will contribute to a stable and growing world (Adomssent, 2013; Lozano *et al.*, 2013). Vicente-Molina *et al.* (2013) found that knowledge has a significant influence on pro-environmental behavior and attitudes towards the environment.

### **1.3.3 CBET as a nature conservancy tool**

CBET focuses on environmental, social and cultural sustainability and plays a vital role in meeting the challenges of sustainability of world tourism (UNEP, 2011). In CBET, local community members are considered protectors of natural resources. It involves residents in conservation practices and often increases environmental awareness. (Hayombe *et al.*, 2012; Zhang and Lei, 2012).

Accordingly to a study developed in Choke Mountain about the *Potentialities of Community Participation in Community-based Ecotourism Development*, at Northern Ethiopia, it is possible to create environmental awareness in the mind of local communities through CBET. If local communities are exposed to the benefits of CBET, they could become increasingly aware of the need for environmental protection for the sustainable management of natural resources. If CBET could be developed, the following environmental benefits would be generated. For example, it improves the water condition of the basin, has impacts on mitigating climatic change, minimizes the impact of agricultural based activities, biodiversity and ecosystem conservation, increases environmental awareness, has ecological and hydrological balance (Aseres, 2015).

This was the main attempt of this internship, placed in Kiulu. Input awareness, trigger critical thought and implement new sustainable practices, which, hopefully, will be followed. The techniques involved on the environmental education program come from a background in permaculture and will be described after the introduction to the concept and its possible fields of intervention.

#### **1.4 Permaculture overview**

The permaculture concept was coined in the mid-70's by two Australian ecologists, Bill Mollison and David Holmgren to describe an integrated, evolving system of perennial or self-perpetuating plant and animal species useful to man (Mollison and Holmgren, 1978). Originally, the word emerged from **permanent agriculture**, based in a previous study about traditional farming practices in Asia, made by an American agronomist called Franklin H. King in 1911 (Paull, 2011). Mollison initially defined it as a conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystem. Later, the concept was extended to several fields of intervention, being considered as a **permanent culture**, where people, their buildings and the ways they organize themselves are central, evolving to a study of the design of those sustainable or enduring systems that support human society, both agricultural & intellectual, traditional & scientific, architectural, financial & legal (Mollison, 1988).

### 1.4.1 Ethics

It is important to refer that permaculture relies in three ethics: **earth care**, to preserve ecosystems; **people care**, to look after self, kin and community; and **fair share**, to set limits to consumption and redistribute surplus. These are distilled from research into community ethics, as adopted by older religious cultures and modern cooperative groups (Holmgren, 2002). This focus in permaculture on learning from indigenous, tribal and cultures of place is based on the evidence that these cultures have existed in relative balance with their environment, and survived for longer than any of our more recent experiments in civilisation (Holmgren, 1978:2000). Though, this doesn't mean that we should ignore the great teachings of modern times, but in the transition to a sustainable future, we need to consider values and concepts outside the current social norm.

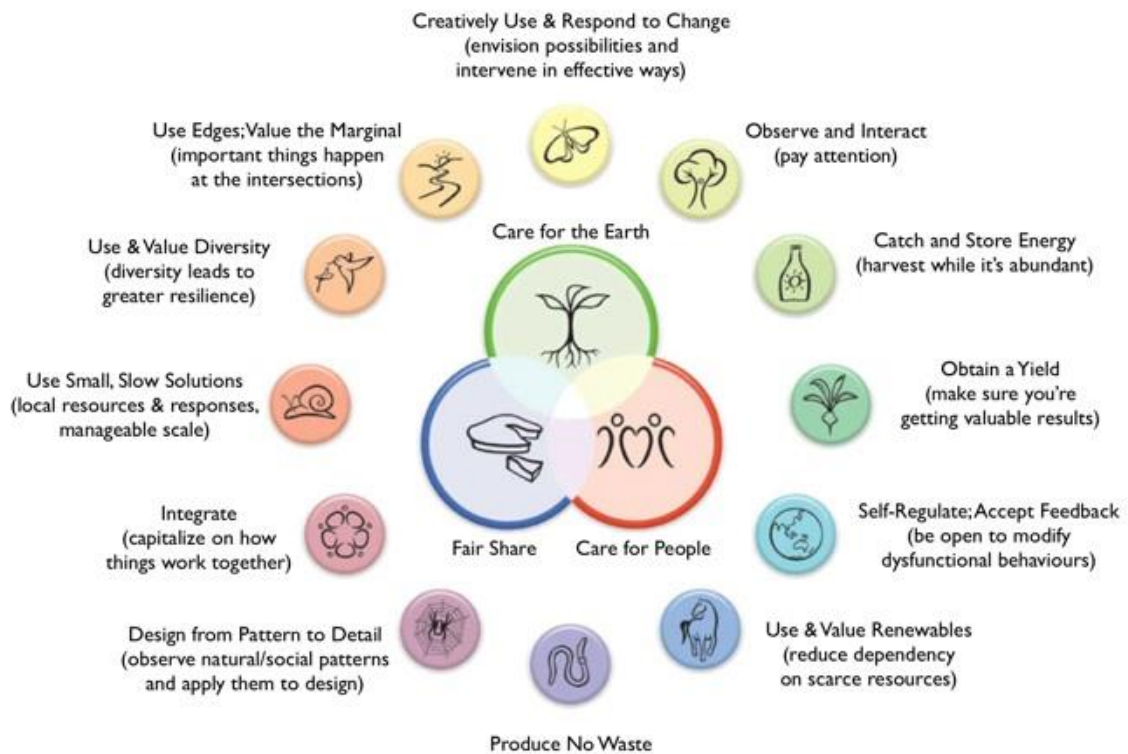
By this, permaculture is an eclectic and adaptive approach that emphasizes local and bioregional perspective and practice. At the same time, it is informed by a global view, maintains a strong tradition of technology and knowledge transfer across diverse areas and cultural traditions, and is fundamentally based on empirical observation and experimentation (Veteto and Lockyer, 2008).

### 1.4.2 Principles

The idea behind permaculture principles (figure 9) is that generalized principles can be derived from the study of both the natural world and pre-industrial sustainable societies, and that these will be universally applicable to fast-track the development of sustainable use of land and resources, whether that be in a context of ecological and material abundance or one of deprivation (Holmgren, 2002). The process of providing for people's needs within ecological limits requires a cultural revolution. In this historical context, the idea of a simple set of guiding principles that have wide, even universal application is attractive.

**Figure 9** - Permaculture principles





Source: [www.permanentculturenow.com](http://www.permanentculturenow.com)

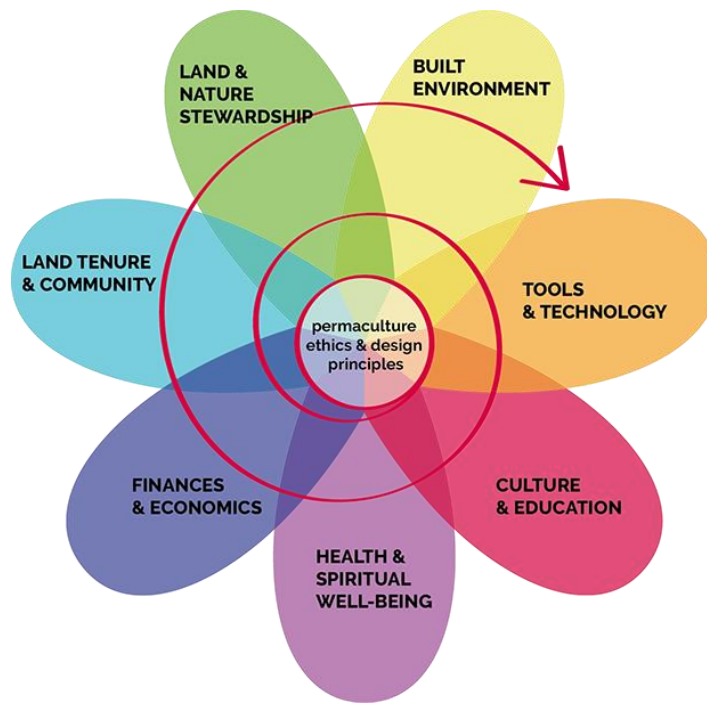
Permaculture principles are brief statements or slogans that can be remembered as a checklist when considering the inevitably complex options for design and evolution of ecological support systems. These principles are seen as universal, although the methods that express them will vary greatly according to place and situation. These principles are also applicable to personal, economic, social and political reorganization (Holmgren, 2002).

### 1.4.3 Fields of intervention

Permaculture models its designs for agroecosystems, buildings, and communities on patterns observed in nature, but perhaps more importantly, permaculture views humans and their creations and activities as part of the natural world. Rather than focusing on human creations, permaculture emphasizes the interconnections among these creations, humans, and the natural world. Permaculturists believe that this focus on interconnections is the best way to create systems that function in a sustainable manner (Veteto and Lockyer, 2008).

The Permaculture Design System Flower (figure 10) shows the key domains that require transformation to create a sustainable culture.

**Figure 10** – Permaculture flower



Source: Holmegren, 2002

Each field of intervention has various applications (Umann, 2014):

- **LAND & NATURE STEWARDSHIP:** Bio-intensive gardening, forest gardening, seed saving, organic agriculture, biodynamics, natural farming, keyline water harvesting, agroforestry and nature-based forestry, integrated aquaculture, wild harvesting;
- **BUILT ENVIRONMENT:** Passive solar design, natural construction materials, water harvesting and waste reuse, biotechture, earth cheltered construction, natural disaster resistant construction, owner building, pattern language;
- **TOOLS & TECHNOLOGY:** Reuse and creative recycling, hand tools, bicycles and electric bikes, eficiente and low pollution wood stoves, fuels from organic wastes, wood gasification;

- **CULTURE & EDUCATION:** Home schooling, Waldorf education, participatory arts and music, social ecology, action research, transition culture;
- **HEALTH & SPIRITUAL WELL-BEING:** Home birth and breastfeeding, complementary and holistic medicine, yoga and other body/mind/spirit disciplines, spirit of place, indigenous culture revival, dying with dignity;
- **FINANCES & ECONOMICS:** Local and regional currencies, carpooling, ride sharing and car share, ethical investment and fair trade, farmers markets and community supported agriculture, WWOOFing and similar networks, tradable energy quotas, life cycle analysis and emergency accounting;
- **LAND TENURE & COMMUNITY:** Cooperatives and body corporates, eco-villages and cohousing, native title and traditional use rights, open space technology and consensus decision making.

#### **1.4.4 Permaculture as a tourism product**

Travel broadens the mind but comes with a carbon footprint. Therefore, practicing permaculture within the tourism sector can be well appreciated by tourists who see this as a way of minimizing their environmental impact and to assure a local-based consumption. Nowadays tourists are more aware, responsible and accurate about their choices. To offer an alternative experience with an environmental consciousness totally differentiates the tourism product, meeting the present demand, while showing a responsible care for environment and people. In addition, permaculture projects often allow hands-on activities which is increasingly sought after by today's tourists.

More than a great tool to implement organic farming, permaculture, due to its popularity, has been showing itself as a great tourism product in many different shapes: eco-lodges, eco-villages, eco-retreats, voluntourism programs, WWOOFing, homestays, among many others who apply green policies, responsible environmental care, eco-friendly habits, self-sufficiency, fair trade and local empowerment. Saying this and crossing it with the previous literature about ecotourism and CBET, it can be assumed they have a common vision and share identical principles.

## CHAPTER 2: Kiulu Farmstay study case

### 2.1 Methodology

The present study case addresses to Kiulu Farmstay project in its entirety, encompassing all stakeholders and focusing especially on MUKEST communities, as they are the direct agents in this tourism product and underpin the project's goal: local empowerment.

After an extensive literature review it's first accomplished a quantitative and qualitative market analysis, approaching KF's supply, demand and annual growth, based on Sabah Tourism published statistics and BET internal data.

Secondly, is presented the strategic framework of this study subject, defining it's mission, positioning, SWOT analysis and goals, based on information given by BET staff.

Thirdly, to pull off the intended objectives, local communities were subject of the study. The homestay experience is described based on participant observation, listing the existing activities available for tourists and a personal analysis by sector.

Fourthly, a description of the inhabitants' daily routine is made, grounded through observation *in loco*, non-structured interviews and a close-ended questionnaire. Seven families from two of the *Lembah Embun* communities (*Kg. Mantob* and *Kg. Pinagon Baru*) were interviewed and followed by close.

The interviews were leaded in an informal way, guiding the hosts into a spontaneous dialogue about their daily practices. The questionnaire was pre-determined, approaching the following topics: household numbers, families' income, farming procedures, water and waste management and construction materials.

Fifthly, the environmental education program held is presented, crossing some permaculture fields of intervention and scrutinizing compost and greywater treatment procedures, identified as priorities. This program took place through an expository, oral and practical training, and the discussion of its results is made through a qualitative critical analysis.

Every word typed in Kiulu's local dialect - *Kadazandusun* - was collected according to a verbal survey and is based on the popular knowledge of the indigenous people. It has not a scientific research.

## **2.2 Market analysis**

### **2.2.1 Supply**

#### **a) Kiulu Farmstay**

Kiulu Farmstay (KF) was inaugurated in August 2015 and encompasses:

- Borneo Quad Biking (BQB);
- Homestay;
- Fig Tree accommodation (FT);
- And several recreational activities.

BQB (link 1 – Links) can be sold as a separate activity, with an approximate duration of three hours, combining adrenaline with rural sightseeing. It's the most popular activity, though not the most eco-friendly if it's consider its carbon footprint. The Homestay (link 2 – Links) experience can combine accommodation, meals and a true relationship with local families. Also it includes traditional rural activities, giving a genuine experience of locals' day-to day life. The FT (link 2 – Links) is an eco-building that provides accommodation in a higher standard. It also includes recreational activities and touch with locals. This recreational activities can happen in various forms, depending on the host family, which will be described further on.

For internal analysis, only the first three sub products are considered, once the recreational activities are inclusive in their packages and were never sold separately so far. Seeing it is a recent born project, the number of visitors from this year isn't sufficiently expressive for conclusive market segmentation, but for some of the sub products this information can already show a clear growth evolution between the first and the second semester of the year, giving a good forecast for the future.

**b) Direct competitors**

A survey was made in order to realize who are the direct competitors of KF, considering the similar packages offered in the region.

For the BQB activity there is a tour operator (ATV Borneo Adventure) with a resembling offer (table 1), operating in Kundasang. The experience provided is alike, practicing an approximate price, equipment, food break and duration.

**Table 1 – Quad Bike experience comparison (tourist testimony)**

<b>Items</b>	<b>Borneo Quad Biking Kiulu</b>	<b>ATV Borneo Adventure Kundasang</b>
Price	Publish: RM150	Publish: RM150
Inclusive: Quad Bike activity, safety gears, light refreshment	Approximately the same, except:  - No knee guard;  - More strict on rules: no short pants;  - Light refreshment is locally cooked (fried mee/rice and hot/cold drinks).	Approximately the same, except:  - Knee guard;  - Light refreshment is cake & a can of soft drinks;  - Free t-shirt (first 100 participants).
Duration	Nearly 3 hours.	2 hours.
Trails	3km on road and 8km is off road (total way/return 22km).	All off road.  In terms of more challenging trail, both are approximately the same.
Advantage	- Scenic view of the valley;  - Community based	- Visit to historical place (earthquake);

	tourism.	- Visit to Desa Cattle;  - Scenic view of Mt Kinabalu.
Guide	Very clear on the SOP/Briefing.	Basic briefing.
Speed	30-40km.	30-40km.
Photo	- No photo was taken. Only sometimes;  - No network coverage at the area.	- There is a photographer following throughout the ride;  - Do have network coverage.

Elaborated by Rosalind, a BET staff member who experienced quad-biking with both companies in 2016 as a customer

Examining the tourist testimony on both experiences, it's understandable that in some aspects BQB is providing a better service (safety briefing, longer duration and local food), but in other hand it's realized that other improvements can be achieved to upgrade the service (constant photo shooting, merchandising and selection of points of interest with historical/cultural explanation).

One main reason for ATV Borneo Adventure to have a higher demand, besides the proximal location to Mount Kinabalu, is the number of quad bikes available (more than fifteen). BQB has ten units (including the guides) and in an internal analysis was noticed that this is a reason for withdrawal, seeing that in general, big groups search for this kind of activity.

In addition, it can be said that BQB website is well achieved and the direct online booking is a great advantage.

Comparing the Homestay supply, there are, at least, sixteen in KF surroundings with online information available, including Kiulu, Pukak, Mitabang and Tamparuli. Most of them offer similar activities, although it's not so well explicit or organized online to be fully compared.

The Fig Tree accommodation doesn't have a similar product nearby to be taken as a direct competitor. A few use the term 'Farmstay' but in different contexts and regions.

For future activities, a zipline was idealized, crossing the river and connecting Kg. Mantob to the Fig Tree. Analysing competitors, it's verified that a near operator already offers two choices of zipline crossing Kiulu River (Zip Borneo).

### **c) Partnerships**

BET has a large worldwide network of partners, covering agencies from the five continents. The largest number of partnerships is national, encompassing two hundred and thirty three agencies in Malayan territory. Other sixty nine are spread throughout Asia, with special expression in Singapore (19).

Secondly is the European continent, with two hundred and one representatives, mainly from United Kingdom (65), Germany (32), Sweden (18), Netherlands (17), Denmark (17) and France (13).

After is Oceania, with one hundred and two representative agencies. Here Australia has the biggest share (84).

In North America has sixty nine partners, which forty eight belong to USA and the remaining to Canada.

For last, Africa has six agents based in South Africa, one for Middle East and South America doesn't have any representation at all.

In Kiulu, BET works as an intermediate for three distinct tour operators that offer complementary activities such as rafting and cycling: River Bug, Traverse Tours and Bike Borneo.

For KF supply there isn't a specific business partner, since all activities are directly provided by BET.



## 2.2.2 Demand

### a) Trend

There has been an up-market trend in tourism over the last few decades. With the rise in disposable income coupled with greater leisure time, better education and increasing sophistication, there is now a stronger demand for better quality products. As such, the market for mass tourism is fragmenting – tourists want more personalized, life enhancing travel in attractive natural environments with quieter resorts, family-oriented holidays or niche market destination hotels. This is witnessed from the declining popularity of beach-based, mass tourism destinations such as Cancún. Sabah tourism is presently experiencing a tremendous growth. With the completion of the new Kota Kinabalu International Airport (KKIA) in 2008 and the impending Asian open skies policy in 2009, there is a need to intensify the development of new tourism products to cater to the increasing number of tourists arrivals (Badawi, 2008).

### b) Nationality

By nationality, according to Sabah Tourism, 2016 arrivals (table 3) are led by nationals (65.8%), followed by other Asian countries (29.6%) and a far distant third place to Europeans (2.5%). All other regions represent less than one percent each.

**Table 3** – Countries of origin of visitors (2016)

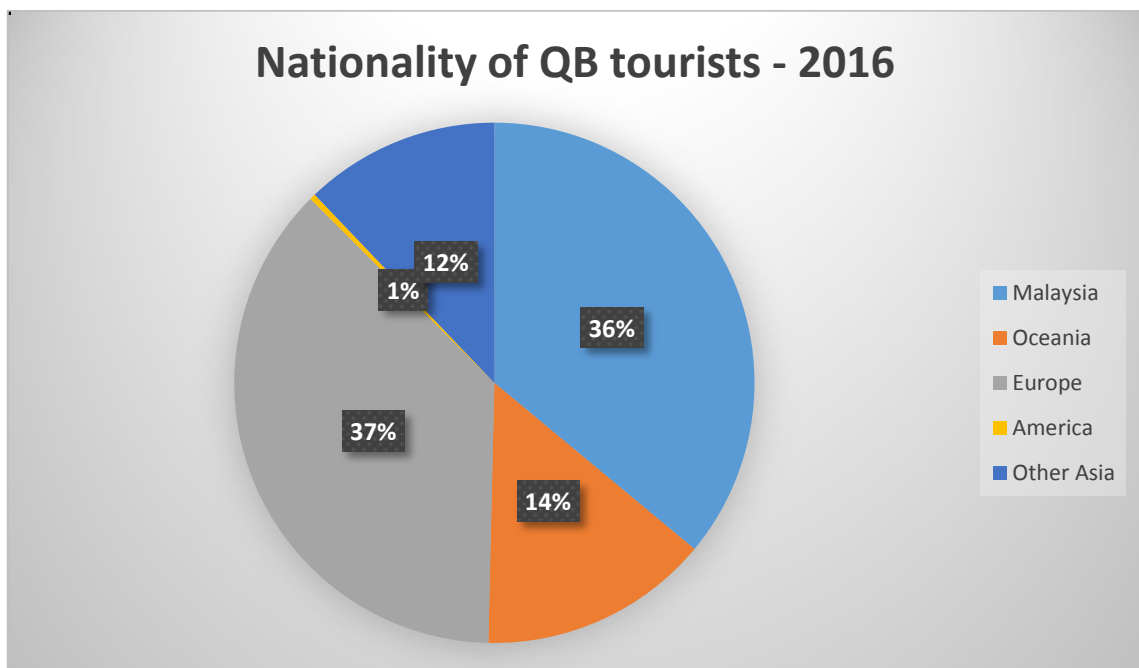
<b>Country of origin</b>	<b>Nr. of visitors</b>
Asia	980,175
Oceania	33,586
Europe	78,939
North America	20,286
Middle East	2,585
Others	13,205
Malaysia	2,299,132

Source: Sabah Tourism

On the contrary, in KF the main visitors after nationals are Europeans (mostly United Kingdom and France) and Australians, showing a slightly different market target (figure 13, 14 and 15).

For BQB, national and European visitors represent the majority of the demand (figure 13), where the last ones come mainly from France (47%), United Kingdom (38%), Germany (8%) and Denmark (6%).

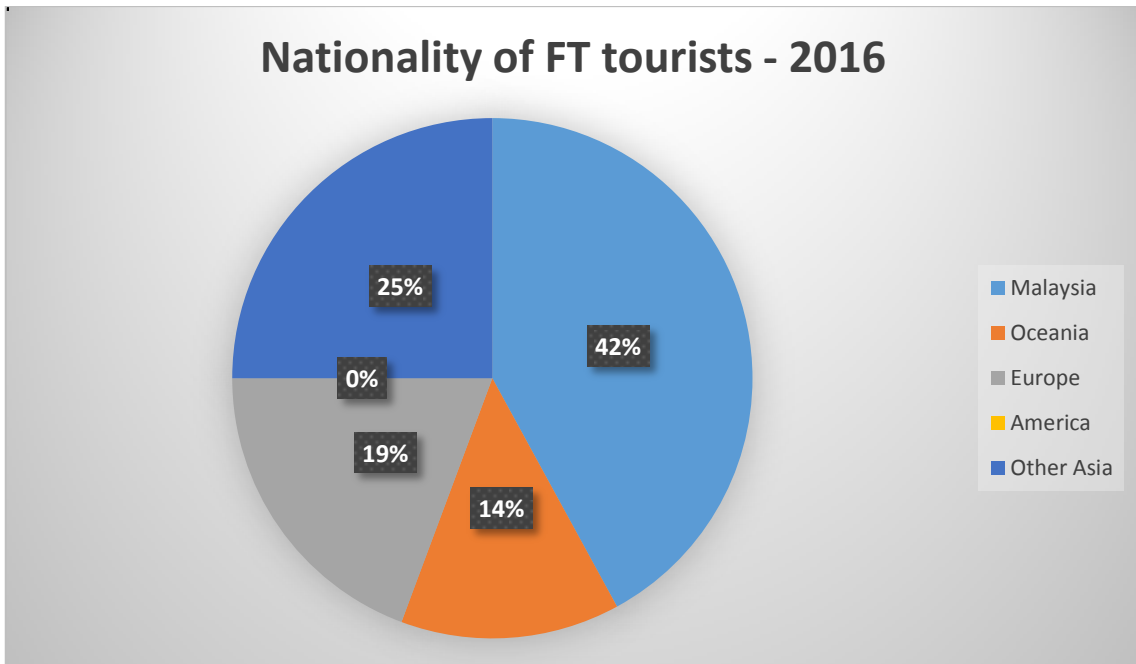
**Figure 13 - BQB tourists by nationality (Jan. - Dec. 2016)**



Analyzing it, can be understood that nationals and Europeans are the keenest to this kind of activity, so maybe a stronger promotion can be required to the partner agencies within this areas.

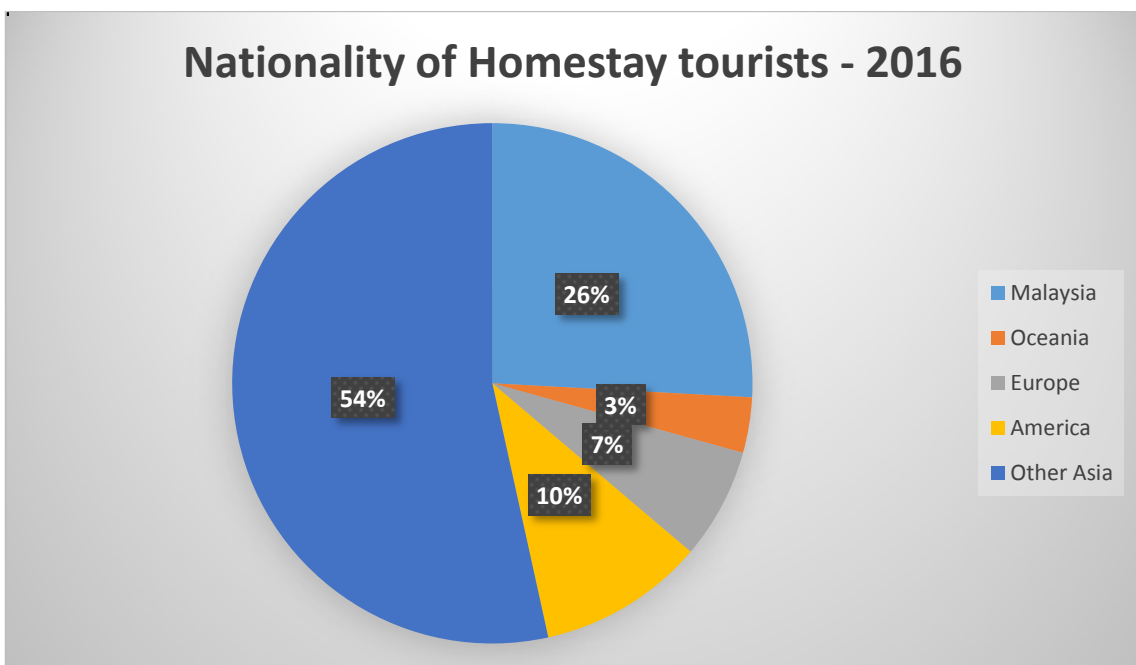
From figure 15 it's realized that national tourists represent almost half of the Fig Tree demand (42%). From Europe the most representative country is the United Kingdom (75%) and in Oceania is Australia (83%).

**Figure 15 - FT tourists by nationality (Jan. - Dec. 2016)**



As it was mentioned before, one large group was receive at once, from a Hong Kong college in an educational trip, so the following graphic (figure 16) cannot show a true demand representation, since the total number of visitors isn't expressive enough.

**Figure 16** - Homestay tourists by nationality (Jan. – Dec. 2016)



Reminding figure 4, from chapter 1, both national and international visitors in Sabah are increasing, giving an exciting forecast for tourism business in Sabah.

### c) Visitor profile

The table 2 show us the demographic profile of Sabah's international visitors from 2016. Since more than half of the tourist arrivals are domestic (Malaysia), the following data is not completely representative of all Sabah's tourism demand. Though, it can trace a good profile of international visitors, helping to define a strategy for specific segment targets of this fast growing market.

**Table 2** –Demographic profiles of international visitors (2016)

<b>Profile</b>	<b>2016</b>
Age Group	21 - 30 (33.5%) 31 - 40 (26.6%) Above 50 (15.2%)
Gender	Male (41.8%) Female (58.2%)
Purpose of Visit	Holiday (88.7%) MICE (3.7%)
Travel Arrangement	FIT (53.2%) Package Tour (31.1%) Mixture (15.7%)
Repeat Visitors	15.0% First Visit (85.0%)
Occupation	Professional / Technical (35.6%) Student / Retired (19.2%) Management / Administration (16.6%)
Travel Accommodation	Paid Accommodation (94.1%)

*Compiled by Research Division for Sabah Tourism Board / Jan-Dec 2016 (Four Quarter YE Dec 2016)*

**Note:**

- 1) Only Direct Arrivals by Air into Kota Kinabalu International Airport (KKIA) were taken into account.
- 2) The above data is based on International Visitor Profile Survey 2016.
- 3) Sample Size: 5,704

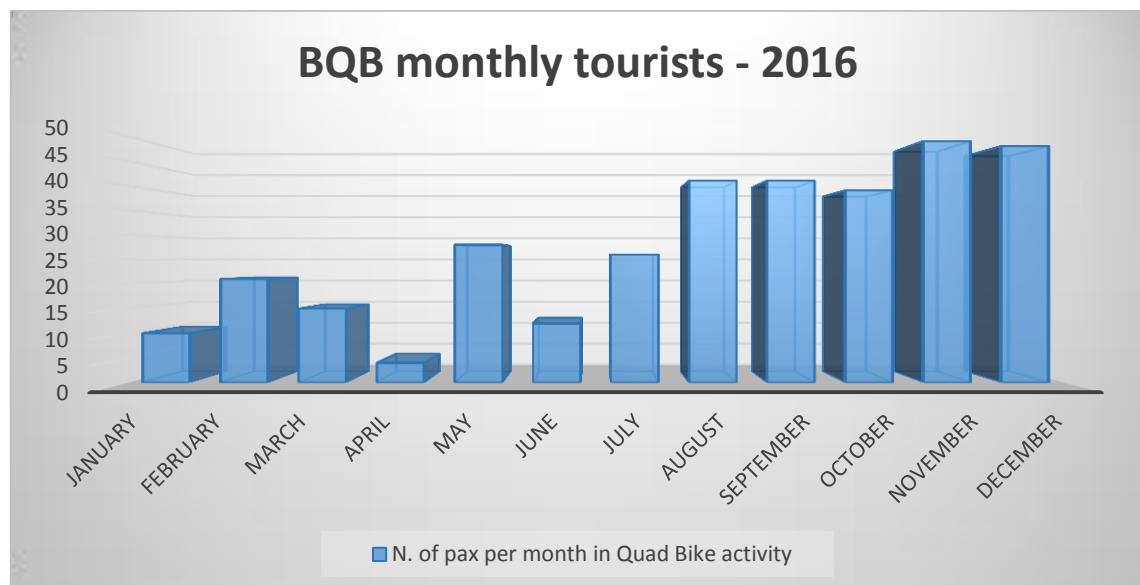
Source: Sabah Tourism

Analyzing the previous information, can be concluded that the majority of Sabah's international visitors are aged between twenty one and forty years old (60.1%), with no significant gender differences and are visiting the state for the first time (85.0%). This leave us no doubt for the age segment target (21-40 years), telling us that this tourists are most likely in a good physical shape and possibly predisposed for nature & adventure activities. As most of them are visitors for the first time, probably Kiulu is not their first preference or the reason of travel to this destination. Though, reviewing chapter 1.1.4, the average length of stay of an international visitor is 8.2 nights, which indicate he has more time to spend in additional activities.

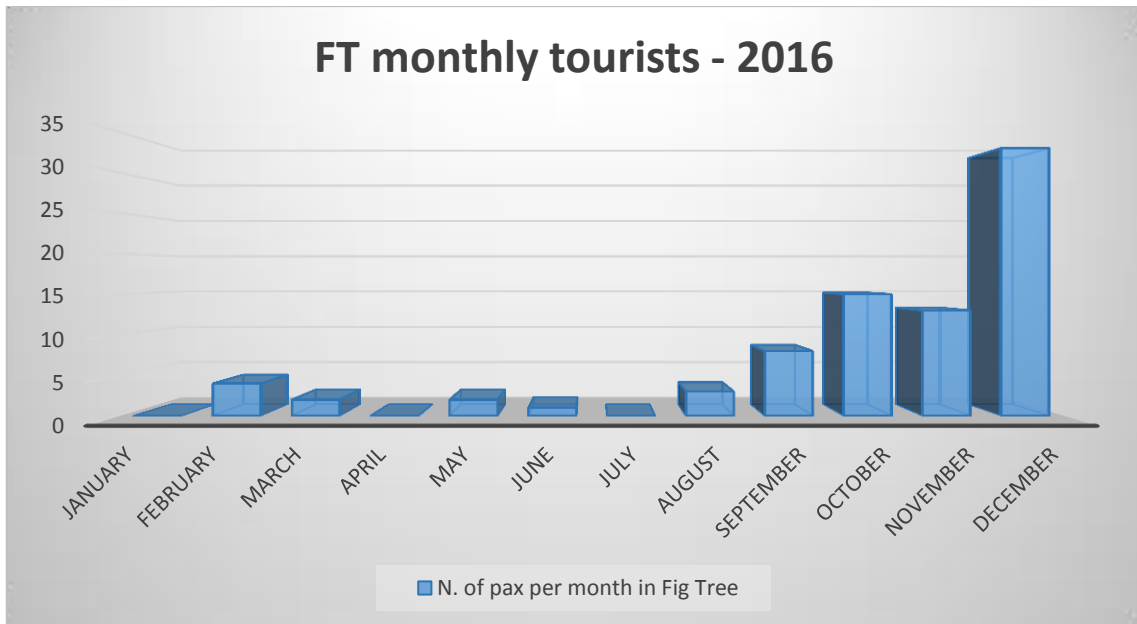
### 2.2.3 Annual growth

Below, three graphics are shown (figure 11, 12 and 13), only with the number of visitors who actually requested and paid for the service (invited guests not included). Like this is possible to have a true perspective on KF demand, as its separate annual growth analysis by sub product.

**Figure 11 - BQB monthly tourists (Jan. - Dec. 2016)**

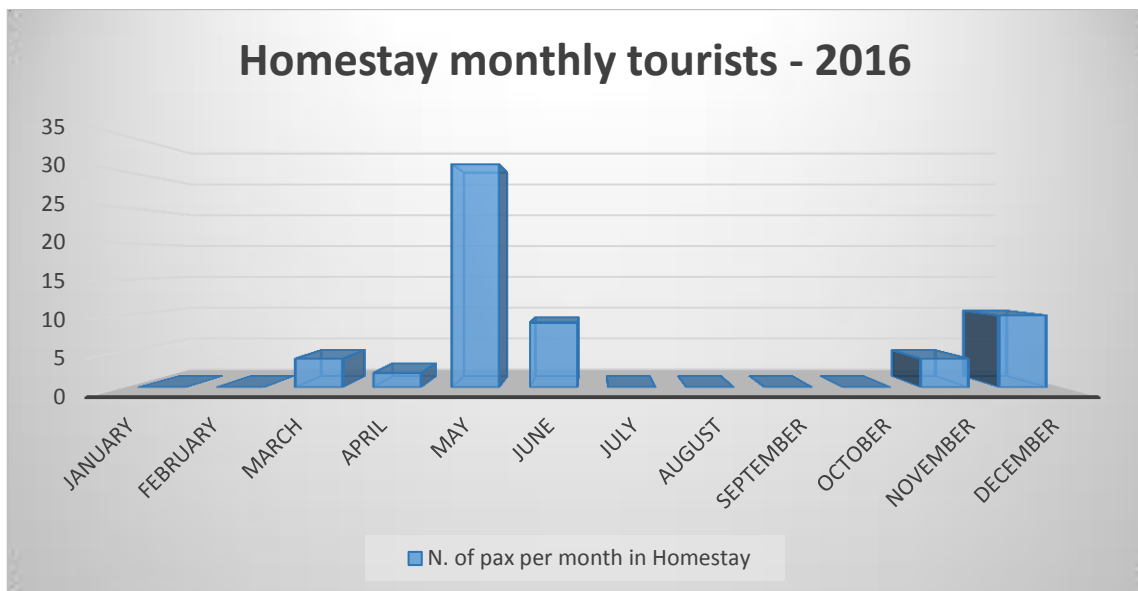


**Figure 12 - FT monthly tourists (Jan. - Dec. 2016)**



Analysing BQB and FT 2016 monthly tourists, it's visible the substantial growth on the second semester of the year. This indicates that the marketing strategy (4 P's) is being satisfactorily effective for a first push.

**Figure 13** - Homestay monthly tourists (Jan. – Dec. 2016)



From Homestay, no conclusion can be taken, once the business is not fully running and the majority of Homestays are still waiting for the government license to start to operate. The high number obtained in May comes only from a student group received at once in a combined tour package.

## **2.2.4 Estimation of market needs**

Accordingly to Sabah Development Corridor report (Badawi, 2008), although Sabah's tourism industry has witnessed tremendous growth over the last decade, key supporting services need to be upgraded, particularly the availability of infrastructure, skilled human resources and public security.

### **a) Support for tourism industry operators**

Tourism in Sabah is largely driven by the private sector. It is crucial that the following supporting services are enhanced to attract and facilitate private sector investment:

1. Infrastructure support, particularly utility services such as water supply, electricity and waste disposal; currently, supply of basic utility services is limited:

- Sewerage systems are already having difficulty coping with current demand;
- Due to lack of regular water and electricity supply, some tourism operators have to truck water supplies in and install their own electricity generating equipment which impact operating costs;
- Potential new tourist sites have limited access to water and electricity.

2. Sufficient skilled manpower:

- Shortage of skilled manpower is prevalent throughout the tourism sector, particularly at middle and upper management, as well as a lack of skilled tour guide, naturalists and language skills.

3. Ability to acquire good quality land on a leasehold or freehold basis at levels which do not compromise a project's commercial viability.

4. Government delivery system; lengthy planning approval processes often lead to bureaucracy and unnecessary delays.

### **b) Services for visitors to Sabah**

Apart from Kota Kinabalu and the major towns in Sabah, most inland tourist destinations are not accessible via sealed roads.

Tourism infrastructure and facilities also require upgrading. Currently there is a poor public transportation, absence of lay-bys and rest-stops along roads, and inefficient information distribution such as road signages and tourist maps. Poor maintenance, hygiene and cleanliness are also major complaints among tourists to Sabah.

## **2.3 Strategic framework**

### **2.3.1 Mission and positioning statement**

The mission of Kiulu Farmstay is to alleviate poverty among the local communities through capacity building and social entrepreneurship, rowing towards sustainable development.

KF positions itself as Community Based Ecotourism, integrating farmstead, homestays and outdoor adventure activities.

### **2.3.2 SWOT analysis**

**Table 4 - Kiulu Farmstay SWOT Analysis**



<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"> <li>• Hospitality;</li> <li>• Genuineness / authenticity;</li> <li>• Local involvement &amp; empowerment;</li> <li>• Direct supply/income in the majority of the activities (no intermediates, excluding river rafting);</li> <li>• Strong online promotion (social network);</li> <li>• Online booking;</li> <li>• Popularity (top google search for ‘Kiulu’);</li> <li>• BET solid business experience &amp; influence;</li> <li>• Ethical &amp; moral value;</li> <li>• Hands-on &amp; traditional experiences;</li> <li>• Eco-friendly facilities (Fig Tree).</li> </ul>	<ul style="list-style-type: none"> <li>• Communication skills (English speakers);</li> <li>• Local people mindset (lack of proactivity and know-how);</li> <li>• Growing competitors;</li> <li>• Agricultural system &amp; practices;</li> <li>• Lack of nature-based activities;</li> <li>• Non-environmental awareness of local stakeholders;</li> <li>• Quad bike (emission of polluting gases and noise);</li> <li>• Inexistence of touristic information available (panels, maps, species identification).</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• Increase of visitor arrivals in Sabah;</li> <li>• Government subsidization (BEST Society);</li> <li>• Private &amp; public institutional support (training: capacity building, culinary, hospitality, etc.; financial support);</li> <li>• BIMP-EAGA (promotion, exchange, fairs);</li> <li>• Educational Institutions support (promotion, research, students’ involvement, bonding with communities).</li> </ul>	<ul style="list-style-type: none"> <li>• Pollution / Climate change;</li> <li>• Natural catastrophes (floods, droughts, etc.);</li> <li>• Plagues / diseases (e.g. ZIKA);</li> <li>• Government support on chemical use (farming products);</li> <li>• No virgin forest;</li> <li>• No ‘significant’ wildlife (lack of flagship species for ecotourism demand);</li> <li>• Over-hunting.</li> </ul>

### 2.3.3 Goals

The main goal of KF is to boost local empowerment, using local resources (accommodation, activities and people), maintaining unique cultural practices and providing the appropriate tools and training for a sustainable development.

In a short term basis, KF intends to embody ten Homestays by the end of two thousand seventeen, with responsible and conscious practices. In a long term basis, KF envisions to become a Sustainability Center, being a pioneer on environmental engagement. No deadline was established for this goal yet.

Quantification for next year's expected growth wasn't discussed yet due to its embryonic stage.

## 2.4 Homestay experience

### a) Global perception

Undoubtedly, there isn't a better way to immerse into a culture than to live with locals. In Kiulu, hosts' hospitality (figure 17) is indisputable and their authenticity makes the experience really valuable. With this, all the rest comes in addition and the tourist can have a true insight of these communities day-to-day life.

**Figure 17** – Host family welcoming



Every homestay has acceptable facilities, although some reveal better conditions than others. In general, the personal evaluation is very positive and recommendable (table 8 - appendix).

In two full weeks spent in Kiulu as a guest (link 3 – Links), every day a new activity was conducted (table 9 - appendix) and every host has shown concern to provide enough entertaining.

### b) Activities description

The following activities are being led within two villages: Mantob and Pinagon Baru. They can vary depending on the host and the village, but there's all kinds of options suitable to different types of tourists (table 5): adventure and sports for the more courageous and athletic ones, hands-on experiences for the curious and participative, and all sort of traditional shows for the ones interested in community culture. Normally, the tourist experience is a combination of these activities, but the choice can be adaptable, depending on the visitor condition and will.

**Table 5 - List of tourist activities**

<b>Ecotourism activities</b>			
<b>Trail</b>	<b>Farm</b>	<b>Cultural</b>	<b>Sports</b>
<i>Gaman Kapur</i> (Mantob)	Fish feeding	Handicraft teaching	Quad bike
Sunrise point (Mantob)	Buffalo riding	<i>Sumpit</i> (Blowpipe)	River tubing
<i>Sinuripan</i> waterfall (Mantob)	Rubber tapping	<i>Binsulung</i> (mind boggling game)	<i>Manangkus</i> (running)
<i>Pirungusan</i> walk (Pinagon)	Paddy planting & harvesting	Show cooking	<i>Mamangkar</i> (bamboo rafting)
<i>Boribi</i> walk (Pinagon)	Rice pounding & sieving ( <i>Tumutu</i> , <i>Mangatap</i> & <i>Moniri</i> )	Gong playing (musical instrument)	<i>Manampatau</i> (paddling on a bamboo pole)
<i>Lemon ginger</i> walk	Medicinal herbs	<i>Sumazau</i>	<i>Mamarampanau</i>

(Pinagon)	recipes	(traditional dance)	(walking on bamboo stilts)
3 days trekking (Pinagon)	Food-forest picking	<i>Kadazandusun</i> traditional costume	River swimming
	Bee-hives visit	Drinks taste: <i>tapai</i> , rice & tapioca wine; <i>montaku</i> .	
	Net fishing		

### c) Outdoor recreation

Quad Bike shows to be the most popular activity of KF. Almost every day tourists from all over the world come to experience it. It's a fast way to know the surroundings for those who doesn't have much time to spend in the area.

For hikers, there's a wide choice, whatever is their preference. It can go from hard and long jungle trekking to farm walks. Some still need improvements along the pathways informative panels could be placed in starting points, so the hiker can have access to clear and detailed information. The water lovers have the option to do river tubing and swimming, or a tour to various waterfalls (figure 18).

**Figure 18** – *Sinuripan* waterfall (Tulung village)



### d) Traditional sports

Bamboo usually is an abundant plant in the tropics and Sabah is not an exception. Therefore, it was, and still is, used to built tools and appropriate equipments with several applications. One example is the traditional sports that came from the use of this material. Tourists are allowed to experiment bamboo rafting (*Mamangkar*), to walk on bamboo stilts (*Mamarampanau*) or paddling on a bamboo pole (*Manampatau*).

**e) Farming activities**

Agricultural labor is the central occupation of these villagers. They all have paddy, fruit and rubber plantations, which represent their main income. Consequently, this is a ‘must do’ activity with locals. In every *Kampung* (village) landscape, the paddy fields (figure 19) give a luxurious green sight, attractive to the eye. Often is possible to observe the ladies passing with the *wakid* (traditional basket) on their backs, to harvest some jungle food.

**Figure 19** – Kg. Mantob paddy field



From plantation and harvesting, to rubber tapping and rice pounding & sieving, tourists have the chance to learn the traditional procedures by watching the experts and to train with their own bare hands (figure 20).

**Figure 20** – Durian tree planting



Activities involving farm animals are also available, such as buffalo riding, fish feeding, bee-hives learning method, among others. It's all about hands-on experiences, which are much sought after today. Tourists don't seek just sightseeing anymore, they want to get involved with locals and participate as one of them. KF is very well positioned in this matter.

#### **f) Culural activities**

All the activities listed above can be considered cultural, since they're attached to the local culture and villagers' day-to-day life. Here, to make some distinction, are included the ones that belong to a specific cultural art: handmade products, culinary (figure 21), music, dance, costumes, hunting techniques and mind boggling games.

**Figure 21** – Jungle food show cooking



Based on personal experience, during two full weeks, every day is possible to try a different type of delicious food, prepared by the talented cooks. In Pinagon Baru, rice and tapioca are also used to produce homemade alcoholic beverages. One obtained through distillery (*Montaku*), other through the fermentation provoked by sugar (rice & tapioca wine) and a last one gained with the addition of yeast (*Tapai*).

The final activity (figure 22) to highlight is the traditional *Kadazandusun* costume dressing and the respective dance (*Sumazau*), accompanied by gongs sound (musical instrument). This is normally used in special festivities, preserving one (and the largest) of the several Sabah ethnics. The *Kadazandusun* dialect (or just *Dusun* for some) is still the first language within these communities.

**Figure 22** – *Kadazandusun* celebration



## **2.5 Community consultation: results analysis**

### **a) Participant observation, questionnaire and interviewing**

The purpose of the homestay experience provided by BET was to observe from inside (*in loco*) this CBET offer and to conduct interviews to the hosts, in order to understand their environmental awareness. The sample is not quantitatively vast (seven families), but from what has been perceived, the behaviors are identical in all MUKEST communities.

The close-ended questionnaire consisted of very objective questions: age, number of children, source of income, paddy field purpose, chemical use on farming, seed collection habit, type of livestock farming, waste segregation and reuse, greywater

management and construction materials (table 10 - appendix). The additional interviews didn't follow a specific structure and were conducted informally along the days to deepen the understanding of this villagers' life.

#### **b) Communities livelihood**

Globally, all *Kampongs'* women are housewives and farmers, leaving to men the rubber tapping task and the state jobs, when applicable. Most of these families income still result from rubber, fruit and vegetables selling. The paddy fields, even though it's their main crop, are used only for own consumption.

With the decadence of rubber prices, families are investing in the tourism sector, improving their houses for the homestay purpose. In their majority, they're still waiting for the government license to start this business, which they expect to come in the first semester of 2017. BET is being a remarkable booster and is already improving these villagers life by including them in KF as direct collaborators and by constantly create non-profitable initiatives for social development, under BEST Society.

#### **c) Farming procedures**

The paddy fields are planted in a permanent flooded system and monoculture basis, without crop rotation or intercropping. Among the seven interviewed families, only one person, individually, planted 'hill paddy', using multi-crop system, with corn and cucumber (figure 23). This last technique shows that paddy doesn't need to be constantly flooded to succeed, being sufficient to just take in care the plantation timing, which must be on raining season in order to provide enough water for the initial growing. The aroma and flavor of this rice proves itself to be more intense and tasty. Also, this was the only farmer who affirmed that doesn't burn the straw obtained from the paddy after harvesting. It's spread on the soil to become compost, where after is planted the cucumber and corn. However, the chemical herbicide use is still present, like all the other farmers. These are given for free by the government, as well as chemical insecticide (Padan®) and fertilizer. Although some say they don't like it because it's 'itchy for the skin', they aren't really aware of the potential harm of this substances for human health. As it is a cheaper, faster and easier way to get rice supply, the undercover dangers (direct, indirect and intrinsic) aren't taken in consideration.



**Figure 23** – Hill paddy with corn consociation



The SRI project in progress, where bio-fertilizers are applied, is already working around some of these issues and it's expected to, hopefully, be followed by other farmers. Some of the interviewees said that they're already making an effort to reduce the chemical use, applying, in alternative, an organic homemade pesticide made of *Ramput Malaysia* (an abundant plant in the surroundings and with proved effect against insect pests) and organic fertilizer as well, coming from a plant called *Pelindung*.

On the other hand, seed collection is a common practice. Every year, the best seeds from the previous crop are selected for the next plantation. This represents a positive attitude towards autochthonous biodiversity preservation, but it was realized that it isn't done because of the environmental value implied, but just because they don't have enough financial power to buy improved seeds every year.

#### **d) Water and waste management**

This, certainly, represents one of the biggest environmental issues at the moment. On water management, a few efforts have been made in rainwater saving and reuse (only in Pinagon) and mountain water collection, supported by government subsidization. Even so, the water cisterns supplied by the government to Mantob village (figure 24), in September 2016, are still useless, once the locals have not yet engaged to install them. Some say they know how to do it, but just feel lazy to do it. Others say they don't have money for proper piping.

**Figure 24** – New water collector (Kg. Mantob)



Yet, the major problem in water management is the absence of treatment after human use. The greywater that comes from sinks, showers and laundry is going directly to the river or to the soil and it represents a significant polluting practice, considering the population density involved. One of the villagers even revealed that one cause of fish's death in the river is through suffocation by the ingestion of hair coming from these same waters.

As well, the blackwater from toilets is being conducted to a main hole, but no treatment is done afterwards. From the information received, a training course was given about the use of a Japanese product for blackwater treatment called *IM Technology*. It was used for a while, but now, the shop who sold it closed and the inhabitants don't know where to find it anymore. However, this was not an in-depth subject, since the author personal knowledge on this topic is not sufficient.

Not less important is the waste management, which represents a serious issue. The consumption of disposable materials within these communities is very high, especially plastic. It was found that recycling is not yet a developed practice in Sabah and the inhabitants don't have the proper means to start it. Consequently, plastic is burned in a regular basis and the glass bottles are buried in the ground or thrown to the river. Their minds are not yet awakened to the serious environmental problems provoked by their attitudes. But, beyond environmental education and awareness, the means must be provided, otherwise the first part is pointless.

The organic waste has already a reasonable ending, once it's separated from the rest and returned to the land. Although it could be used to obtain organic fertilizer for

planting instead of using the chemical ones provided by the government, the actual procedure doesn't represent an environmental threat. As it is a natural material, it decomposes really fast in the soil, especially in the tropics. Thereby, a natural cycle is closed, giving back to nature what was taken.

#### **e) Building materials**

Even if a large amount of natural building materials are freely available within this area, the housing construction relies only in three main materials: cement, wood and zinc. The only found reason for them to use mostly cement, is the lack of knowledge on this subject and the nonexistent specialized workforce on this matter.

## **2.6 Environmental education program**

The use of the permaculture concept for the present project is just a way of showing some of the practices that can be adopted, so people can become environmentally friendly and socially responsible. What is meant to say, is that the name of the concept, or its definition, is not the relevant part, but instead, it's its message and examples of appliance.

### **2.6.1 Event n. ° 1**

The environmental education program started with an expository presentation, held on the 6<sup>th</sup> of November, in the Farmstay *sulap* (common area), introducing to the *Lembah Embun* communities several ecological techniques and practices: bio intensive agriculture (a), seed saving (b), natural building (c), recycling (d), composting (e), greywater natural treatment (f) and general environmental awareness (g). Considering the lack of time and observing the main environmental issues in these villages, it was decided to deepen two natural ways of waste treatment: one for organic waste (composting) and other for greywater (banana circle). In the end, a practical application was conducted next to the fig tree, where all the audience had the chance to build a compost pile with their own organic waste and the natural materials available in the surroundings (link 4 – Links). No one had previous knowledge in any of these procedures.

#### **a) Biointensive agriculture**

Biointensive agriculture is an organic agricultural system which has been shown to result in maximum yields from the minimum area of land, while simultaneously improving and maintaining the fertility of the soil. It is particularly designed for the small-scale grower (Jeavons, 2001).

The chemical use and the monoculture system valued by conventional agriculture, contributes not only to soil erosion, but to eliminate natural predators for pests and to power the dependence on artificial fertilizers. Furthermore, already exist several studies about how these chemicals can act as silent killers for our health. All over the world voices are rising against this type of agriculture and many countries are adopting full organic procedures.

Small-scale production, intercropping, crop-rotation, plant consociation and composting are advised as beneficial methods to create natural abundance in farming.

#### **b) Seed saving**

Again, with conventional agriculture, the crop diversity decreased drastically, provoking vulnerability to pests, diseases and climate change. When improved or genetically modified seeds are bought, the autochthonous biodiversity is lost, giving place to extended uniform plantations, more easily exposed to plagues and with special need of chemical use.

Multinational corporations, such as Monsanto and Bayer (recently merged), want to privatize seeds, so they can monopolize the market. It's a part of the farmer job, to be aware of this situation, in order to prevent biodiversity loss, to reproduce without chemicals and to freely plant its landrace seeds. A significant way to fight this is to collect and store heirloom seeds, and exchange them with other farmers in the surroundings, encouraging fair trade and saving money.

#### **c) Natural building**

Natural building comes from the use of renewable resources available on land and with minimal processing. It combines a range of construction methods, such as adobe (clay blocks), cob (mixture of clay, sand and straw), earth bags, rammed earth (formwork), cordwood, straw bales, timber framing, among others. The local materials

involved must be consciously harvested, without compromising the ecosystems. It's an ecological, sustainable, healthier and simpler way to construct strong, durable and thermally massive houses.

All these materials can be obtained in Kiulu, where the soil is extremely rich in clay, the paddy fields provide large amounts of straw after the harvesting season, and the fast growing bamboo is everywhere. The construction process doesn't demand technology use, being achievable only with human labor.

#### **d) Recycling**

Now is perceived that a consumerism time is being lived, where everything is disposable and created to last less. The planet earth is a finite resource and the ecological footprint caused by Man has already surpassed its biocapacity to regenerate it. If the human attitude doesn't change quickly, this planet will turn into a giant dump. The consequences are already visible: climate change, lack of drinking water, trash islands, soil contamination and much more.

Materials such as plastic and aluminum, when dropped in the land, last thousands of years to decompose. Glass is estimated to take millions of years or maybe never. That is why, besides consumption control, recycling should not be optional and everyone must do it. It's the only way to reutilize endlessly what is consumed and reduce waste production.

What is happening is that a large percentage of human population still doesn't have the proper education to accomplish this and many places aren't yet prepared to facilitate this process with the necessary equipment. MUKEST communities are a visible example of that. Despite of the remote area where they live, the plastic consumption is very high and their way to get rid of it comes in all sort of wrong ways as it was referred before.

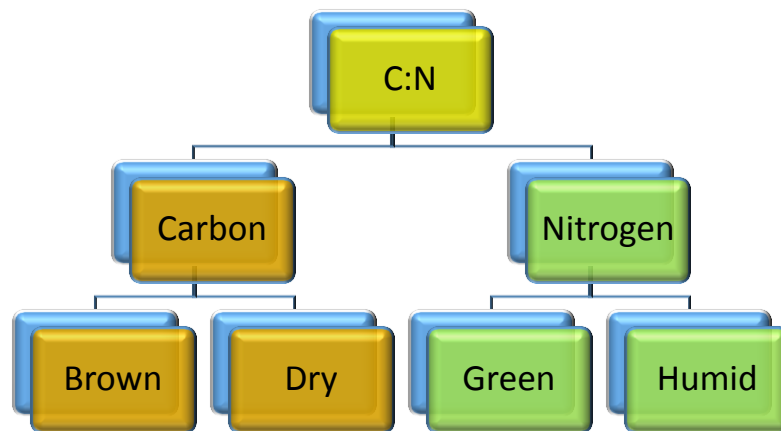
#### **e) Composting**

Composting is a valorization process of the organic matter. It consists in the decomposition of domestic waste by the action of microorganisms in the presence of oxygen (aerobic process) and giving rise to a substance called compost. The organic

waste is digested by the combined work of worms, fungi and bacteria, turning what so often known as common garbage into fertile soil (Kreuter, 2014). The result is a perfect humus composed by benefic nutrients for the soil, prolonging its youth.

For a compost pile to succeed, two essential elements are needed: carbon and nitrogen (figure 25). Carbon can be found in dry matter, also called as brown matter and nitrogen is present in green plants, also known as green matter (Rodrigues, 2006). This is shown in the scheme bellow.

**Figure 25** – Compost essential elements



In the next table (table 6), a list of examples is given:

**Table 6** – List of appropriate material for compost

Brown	Green
- Hay	- Green plants
- Straw	- Raw vegetables
- Sawdust / shavings	- Fruit
- Dry leaves / dry grass	- Organic kitchen waste
- Small branches	- Green leaves and flowers

Adapted from Calvo and Mila, 2009

Other materials rich in carbon can be added in smaller quantities. Ashes from natural burned wood are a powerful potassium source, improving the soil quality. But it cannot be exaggerated, a handful is enough for one pile. Cardboards or napkins can also be added to the compost pile, as long as they don't have any chemical painting on it (Calvo and Mila, 2009).

From the kitchen waste, not everything can go to the compost pile. Even some of the organic matter is harmful for it. Below, the table (7) where the allowed and forbidden waste is listed:

**Table 7** – List of allowed and forbidden waste in a compost pile

<b>Good waste</b>	<b>Forbidden waste</b>
- Vegetables	- Meat or fish
- Fruit peels	- Dairy
- Cooked rice and pasta	- Plastic, glass or metal
- Coffee grounds	- Medicines
- Eggshells	- Pesticides or diseased plants
- Tea bags	- Human or animal dejects

Adapted from Calvo and Mila, 2009

The procedure to generate a compost pile is a very simple, easy and cheap method. No special materials are demanded, although some tools can be used to facilitate the labor and the decomposing process: compost box (to retain humidity and avoid strong rain); farming fork (to move the pile) and pruning shears (to cut the bigger pieces). The shorter the pieces are, the faster the decomposition process will be. In the pictures below (figure 26, 27, 28, 29 and 30) it can be seen the several methods to build a compost pile.

**Figure 26, 27, 28, 29 and 30** – Shapes of composting



Source: [www.pinterest.com](http://www.pinterest.com)

The use of a compost box isn't compulsory, but in tropical weather would be recommended, in way to avoid excessive water in rainy season.

There are two types of compost: hot compost and cold compost. For the last one isn't needed special attention in the added quantities or to move the pile regularly, but it should be known that the decomposition process will take much longer (more than 5 months). On the other hand, the hot compost requires special care to succeed. The added carbon and nitrogen must be in an optimum ratio (normally 2:1), the material must be humid (not soaked) and the pile should be moved, ideally, once a week to accelerate the process (ensures that oxygen is constantly available). When this procedure is correctly followed, between 48h and 72h later the pile will reach about 55 Celsius degrees (Calvo and Mila, 2009). For this to happen, the compost must have a minimum size:

- Compost pit: 60cm width x 40cm height x 150cm length
- Compost pile: approx. 2m diameter x 1m height
- Box: 1m<sup>3</sup>

The pile doesn't need to be done all at once. The layers can be added as the material becomes available, but the size should not become too big: it will cause overheating.

Procedure:



1. Spread small branches (to create aeration and avoid compaction);
2. Add 5 to 10 cm of brown matter;
3. Add 5 to 10 cm of green matter;
4. Add up a handful of dirt (contain microorganisms); Attention: too much dirt compacts the compost!
5. Add 5 to 10 cm of brown matter;
6. Repeat step 2 to 5 until, at least, 1m height;
7. If the material is dry, water each layer with enough quantity to make it humid.

The last layer should always be with brown matter, in order not to attract insects or other animals. After 2 to 5 months, if done correctly, it will become fertile soil with dark brown color and forest smell, ready to be used in any crop, plantation or garden. Thereby, the soil fertility will be multiplied with no need of chemical fertilizers use, improving the quality of the soil, plants, environment and our health. At the same time, it will reduce waste and close a natural cycle (figure 31).

**Figure 31** – Compost cycle



Source: [www.uaex.edu](http://www.uaex.edu)

On presentation day, in addition of explaining this process both on theory and on practice, was also given a bilingual tutorial (English and Malay) describing the whole process, measures, boxes examples and a table of possible mistakes to be

consulted, in order to understand what can be done to reverse it (table 11 – appendix). This workshop was based on previous personal experience on the field in different projects around the world, including the tropics.

Later, along the monitoring of their engagement, villagers showed total understanding about the procedure and no difficulties were shown.

#### **f) Greywater treatment and reuse (banana circle)**

Greywater is considered to be the after use water coming from a sink, a shower or laundry. It contains traces of dirt, food, grease, hair and cleaning products, which are pollutants to groundwaters, rivers or estuaries. In every homestay, all the greywaters are being directly routed to streams or discharged into the soil and it should be a case to take seriously in care, considering the amount of inhabitants in those villages.

Several reasons can be named to justify why this should be changed. One is the environmental issue itself, taking in care that the life of water is cyclical and the present polluters will return with rain. Another is the threat to wildlife, contaminating its habitat and food supply, not only in Kiulu, but all the way to the ocean. Other reason can be human health, considering they bath and fish in these waters. And one other, very important for the touristic business, is the less aesthetic look, not only of the houses (open sky pipes), but also of the river (color and formed foam).

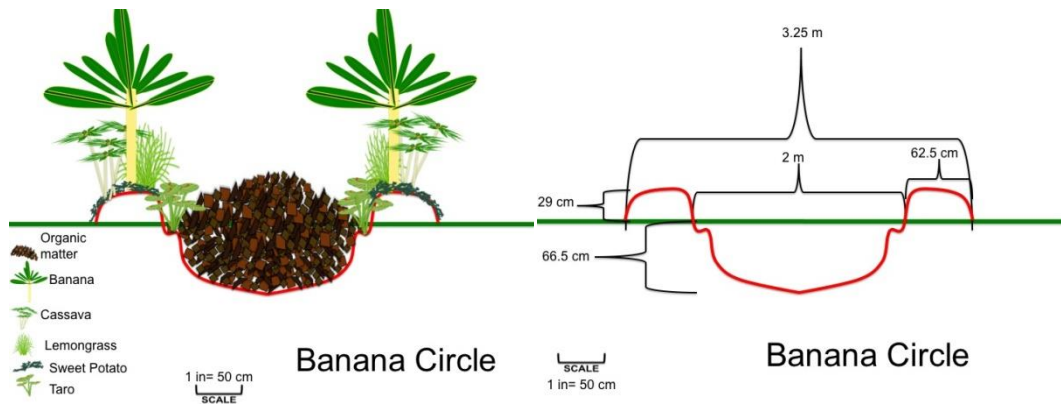
To reverse that, there's a simple method that can be easily applied with minimum costs involved: the Banana Circle (figure 32). It's a natural system that represents multiple functions:

- Greywater treatment and reuse;
- Decomposition of organic matter (compost);
- Food production;
- Habitat for wildlife.

Banana plants are hungry living beings, which need large amounts of water to be productive. Therefore, the Banana Circle shows to be a very effective system to grow

fruit and other vegetables, at the same time that the organic waste and the greywater is being reused. In this case, the greywaters don't represent any harm to the plants, acting, on the contrary, as a safe and valuable source for them. Like this, in addition to all benefits, the river pollution is avoided and another cycle is closed.

**Figure 32** – Multicrop Banana Circle example and advisable measures

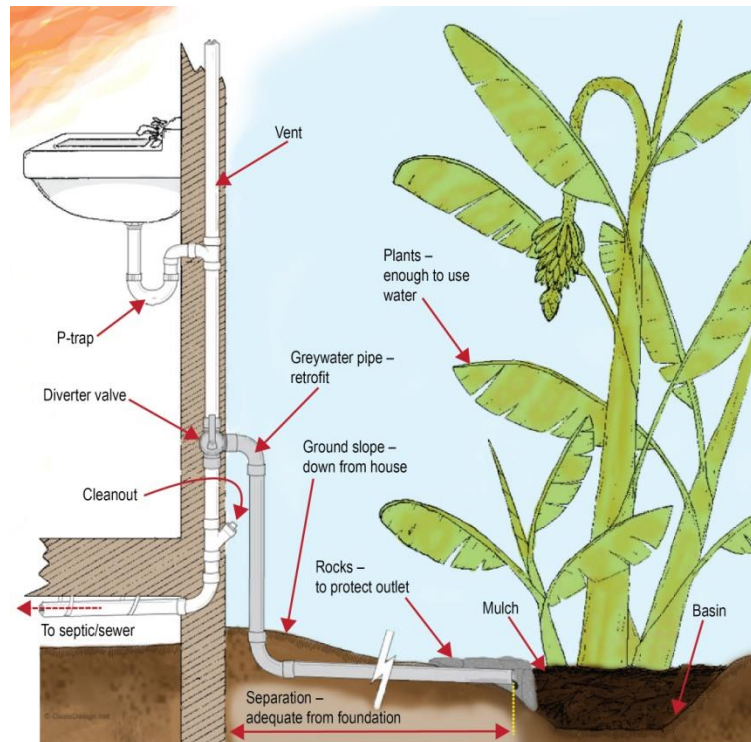


Source: Tree Yo Permaculture

For this example, seven banana shoots are used, equally distributed around the top of the circular mound made with the earth of the dugged hole in the center. Between, the other plants can be placed as is shown in the first figure. It's possible to use other species, as peanuts, ginger, canna lily or comfrey. The central hole must be fed constantly with organic matter, maintaining a convex shape and the greywater must be directly discharged in it, through an underground pipe.

If there isn't enough space for this specific design, it can be made smaller or, at least, with just a banana plant directly connected to the greywater coming from the house (figure 33). Alternative plants can also be used, like papayas or even coconut palm trees.

**Figure 33** – Greywater natural system



Source: [www.yourhome.gov.au](http://www.yourhome.gov.au)

This subject is based on a Permaculture Design Course taken in 2015 and in previous volunteer experiences abroad.

### **g) General environmental awareness review**

During the two-week homestay experience, informal conversations were held with the hosts, drawing attention to the importance of nature conservancy, using direct examples on the spot and slowly familiarizing them with the themes planned to be approached. On presentation day, before the compost pile activity, a review was made about good green policies, alerting for the consequences of their bad habits and emphasizing the meaning of sustainability.

### **2.6.2 Event n. ° 2**

The following week, on November 13, the Sustainability Day was celebrated under the tuition of BEST Society and in collaboration with the INTI College Sabah, being created a full day of activities for adults and children, including a cook competition, local handicraft workshops and selling, garbage collection, seedling,

videos, recycling games and much more (link 5 - Links). Composting procedures were reinforced on practice once again, this time for BET staff on field.

### **2.6.3 Event n. ° 3**

Again independently, the environmental education program continued to follow its contours. Later on, at December 20, another event was held, this time separately for children and adults.

First for youngsters, several environmental education games were prepared, enhancing Borneo's endangered wildlife, ecosystem's value and habitat's threats, among others environmental issues (link 6 – Links). Through memory games, drawings, songs and jokes, they could learn a bit more about environmental care.

For grownups, another presentation was held, reinforcing the dangers and impacts of burning plastic, delivering a related article, followed by a bilingual (English and Malay) tutorial of the banana circle procedure. After the talk, was time for another hand-on class, the banana circle construction in one of the homestays' garden, so the villagers could really deepen the taught knowledge (link 7 – Links).

## **2.7 Additional achievements**

### **a) General awareness for BET staff**

During the time spent on BET head quarters doing research and collecting data, it was also prepared a questionnaire to all the staff about their consumption habits, in order to understand their environmental awareness. Most of them demonstrated a lack of knowledge on this subject, revealing that this was a good initiative to emphasize some basic subjects, not just to improve their personal eco-friendly habits, but also to empower their capacity to truly engage in ecotourism and to intervene in Kiulu with a grounded knowledge. Therefore, a presentation was elaborated approaching Kiulu's project theme and the subjects where they revealed less awareness: recycling, plastic consumption, sources of energy, organic kitchen waste disposal, water waste, fair trade issues, with special emphasis to the palm oil industry and, finally, carbon footprint and car sharing.

## **b) Beautiful house contest**

By personal wish to extend the stay in Sabah and a new placement opportunity with the same tour operator (BET), three more months were spent in Sabah. Though in a different area and with a new project, it was possible to continue to push-up Kiulu's villagers' engagement. For that, BET, BEST Society and MUKEST gave a special funding for another event: The Most Beautiful House Contest.

Always with the goal to work for a more sustainable Kiulu, this contest was idealized as a way to give the chance to all MUKEST communities to show their engagement on environmental sustainability, after the taught practices during the environmental education program previously held. The prizes were monetary, considering this would be the most appealing offer and for them to see a physical and direct gain on this participation.

The purpose of this contest was to encourage locals to improve the aesthetics of their houses in a responsible and thoughtful way, generating a clean and pleasant look within the surroundings. The criteria chosen for the competition consisted in three main eco-friendly practices identified as a priority in this location: greywater natural system (e.g. banana circle), organic kitchen waste reuse (e.g.: composting) and recycling (eradicate plastic burning and littering). Besides that, was also considered the creativity on reusing disposable materials to create a beautiful scenario and an artistic touch. To keep up their progress and updates, a *whatsapp* group was created for everyone to share doubts, information and pictures of their achievements (link 8 – Links).

On the last week of March, 2017, a few days were reserved to return to Kiulu and do a final monitoring and help. The contest day was on the 31<sup>st</sup> of March and along this day, every participant's house was visited and submitted to the evaluation, from 1 to 5 points (table 12 - appendix).

From a first phase of 22 participants, the 10 who fulfilled more criteria were selected for the final evaluation (figure 34, 35, 36, 37, 38 and 39). Though, they were all considered winners for showing interest and will to participate. To decide the first, second and third place, which would take a cash prize of 500RM, 200RM and 100RM correspondently, wasn't an easy task and big congratulations were given to everybody.

At the end everyone celebrated together the beginning of a greater and sustainable Kiulu.

**Figure 34, 35, 36, 37, 38 and 39 – Contest participants**



## 2.8 Proposals

### a) Recycling

When an Ecotourist plans his vacation, he seeks to find natural environments the more untouched as possible. The more natural it is, the more he appreciates it. Also, he is a concerned tourist, normally aware of the environmental issues in the world, trying to cause the less impact he can.

Therefore, the appropriate tools should be given to the communities, so they can have the opportunity to change to eco-friendly habits, creating a more pleasant and clean view for tourist and themselves, at the same time they're protecting nature.

A partnership could be established with a recycling company, agreeing to a monthly collection in a strategic place, convenient for all the MUKEST communities. Large size containers should be provided.

**c) Veterinary health care**

A government support should be requested to ensure veterinary health care, including free sterilization and vaccination. There is an abundance of pets around the place with an ill-treated appearance, which comes from irresponsible care and decontrolled procreation. The living standard of the local population is not enough to provide proper care to these animals. Often, they complain that veterinary assistance is very expensive.

This not only poses a threat to public health, but also diminishes the quality of the tourist destination.

**d) Community library**

As a literary incentive, an old fridge could be restored with hand painting and filled with second-hand books. It could be placed under a hut at Farmstay.

**e) Ecotourism activities improvement**

Informative panels could be placed in the trails starting points, giving to the tourist clear information. Example: brief trail description and mapping, points of interest, main fauna & flora, trail extension, difficulty level and emergency contacts.



## Discussion

We have reached a point in human development in which we must analyze our current structures of value and production methods. It is imperative that we consider a new practical framework for food production and relationship with nature. At the current rate we will exhaust all resources and space, causing irrevocable damage to our ecosystems and societies. We must infuse a sense of environmental responsibility and social morality within science and technology. Kiulu is not an exception and the recent KF project has been showing how tourism can reverse this trend, though there's still a long way to go.

In a growing number of instances, tourism delivers funds for conservation and provides local people with an economic incentive to protect biodiversity. Tourism also offers an alternative to potentially damaging forms of development such as mining, logging, or consumptive use of wildlife (Christ *et al.*, 2003). More specifically, CBET advocates the relationship between ecotourism development and the local community to its ability to provide development alongside environmental care. It is promoted as a mean of ensuring that conservation is financially viable through the development of revenue-generating schemes for locals (Bagul, 2009), which inevitably entails restrictions in the traditional usage of local resources by the residents (WWF, 2001).

By this, it was important for Kiulu communities to understand what was underpinned under the environmental education program, so they could sight a direct benefit on KF project. Local communities may benefit in economic terms as well as create a commitment to conservation and sustainable development. Since local community participation plays a vital role in ecotourism, the success of an CBET project depends to some extent on the success of local community participation (Bagul, 2009). More concretely, without their participation and commitment, the KF project would not make any sense, since they are the main actors and beneficiaries of this tourism product.

Receding slightly and looking at CBET pillars: economic, socio-cultural and environmental benefit, is consider that KF, since last year, was already causing a vigorous effect on people's life and local empowerment had been remarkable so far. It's also laudable, the effort on changing conventional farming procedures, so often

based in a strong use of pesticides, into organic agriculture (SRI project). Besides its main importance for human wealth and biodiversity preservation, it additionally represents an appealing agritourism offer, regularly appreciated for the concerned ecotourists.

On the other hand, although the FG itself was already based in sustainable practices (natural building and eco-sept water treatment), all the present and future homestays still showed a lack in this matter. Therefore, environmental education was a strong tool to apply, so the natural environment can be preserved and an even better ecotourism experience can be provided.

The language barrier showed to be the main restraintment during the environmental education program. Most of the inhabitants don't speak English and poorly understand it. Event days and tutorials were translated by locals or BET staff, but it's feared that some information has been lost along the way.

Also, was understood that people from this area are, by nature, very shy. Which showed to be a reason of withdrawl.

In general, everyone involved was very receptive and made a true effort to engage and it's believed that a new trigger was ignited. As a starting point, real changes were accomplished in small-scale and could be observed that local stakeholders have interest to adapt to new changes if they see a tourism business opportunity with this scenario.

To assure this project's continuity and success, it should be done a constant monitoring and reinforcement, in order to ensure progresses and to truly prove that CBET can act as a nature conservancy tool in a long-term basis.

## **Conclusion**

This study advocates the practice of CBET management to uphold the end goal to safeguard the natural environment from damages. CBET can help fulfil many needs and demands such as conservation and protection of natural and cultural resources; guarantee community involvement and management in tourism development and activities to facilitate the protection of environment; provide crucial training and skills relevant to the local tourism industry to the members of the community; and integrate activities from the private sector. Conducting drills like social research, locals information and awareness, training and capacity building will track improvements in this region.

Kiulu Farmstay showed to be a well thought out scheme to generate remuneration for the local community and enhancing awareness of natural conservation. All manifestations are minimising enormous waste and wastewater generation by encouraging ecological protection behaviour, empowering women and securing multi-racial society and customs.

Also, KF ensures the involvement of local communities from the grass root level to enhance their living standard. In this study, it is ascertained that CBET development can be the main mean of livelihood improvement for the rural communities of Kiulu. In general, CBET can bring sustainable community development for MUKEST and its surroundings in terms of economic and socio-cultural dimension and it will also be a tool for rehabilitation of the threaten ecosystems.

Indeed, is a good method for local communities to follow for further sustainability. It's true that ecological surroundings started to be conserved for touristic purposes and for economic prosperity. The villages have improved and, most of all, nature is being preserved.

Concluding by this study and comparing it to other scientific publishments, it can be affirmed that CBET can act as a nature conservancy tool, changing local stakeholders' habits in order to meet the ecotourism demand. Overall, CBET shows to

be the best alternative to improve the poor rural communities of Sabah and it is a mean of maintaining the ecological balance of this rural areas.

## **Links**

Link 1 – Borneo Quad Biking

<https://borneoquadbiking.com/>

Link 2 – Kiulu Farmstay accommodation offer

<http://kiulufarmstay.com/accomodation-and-other-facilities/>

Link 3 – “Two weeks experiencing Homestay – A tourist perspective”. Article by Filipa Gomes

<http://kiulufarmstay.com/2016/11/two-weeks-experiencing-homestay-in-kiulu-a-tourist-perspective/>

Link 4 – “Kiulu Farmstay: Environmental education program”. Article by Filipa Gomes

<http://kiulufarmstay.com/2016/11/kiulu-farmstay-environmental-education-program/>

Link 5 – “Celebrating Sustainability Day with Kiulu folks!”. Facebook post by BEST Society.

[https://www.facebook.com/pg/bestsocietysabah/photos/?tab=album&album\\_id=1581964855178865](https://www.facebook.com/pg/bestsocietysabah/photos/?tab=album&album_id=1581964855178865)

Link 6 – “Environmental Education Day for Kiulu children”. Article by Filipa Gomes

<http://kiulufarmstay.com/2016/12/environmental-education-day-for-kiulu-children/>

Link 7 – “Teaching day for MUKEST”. Article by Filipa Gomes

<http://kiulufarmstay.com/2017/01/teaching-day-for-mukest/>

Link 8 – “MUKEST environmental commitment”. Article by Filipa Gomes

## References

- ADOMSSSENT, M. (2013). Exploring universities' transformative potential for sustainability-bound learning in changing landscapes of knowledge communication. *J. Clean. Prod.* 49, 11-24.
- ANDRADE, M. (2008). Ecotourism: A Tool for Community Development Panacea or Mere Rhetoric? The case of Puerto Princesa. Palawan Island, Philippines.
- ASERES, S. (2015). Potentialities of Community Participation in Community-based Ecotourism Development: Perspective of Sustainable Local Development a Case of Choke Mountain, Northern Ethiopia. Madawalabu University, Ethiopia.
- BADAWI, A. (2008). Sabah Development Corridor. Kota Kinabalu, Malaysia.
- BAGUL, A. (2009). SUCCESS OF ECOTOURISM SITES AND LOCAL COMMUNITY PARTICIPATION IN SABAH. Victoria University of Wellington. Wellington, New Zealand.
- BARR, S., GILG, A.W. (2007). A conceptual framework for understanding and analyzing attitudes towards environmental behaviour. *Geografiska Ann. Series B Hum. Geogr.* 89 (4), 361-379.
- BELSKY, J. (1999). Misrepresenting communities: The politics of community-based rural ecotourism in gales point manatee. Belize: *Rural Sociology*, 64 (4), 641-666.
- BHATTA, K.D. (2008). Urban Heritage Conservation: promoting Sustainable Community Development: a case of Historic Town Thimi, Nepal. HKU theses Online.
- BLASER, J., SARRE, A., POORE, D., JOHNSON, S. (2011). Status of tropical forest management 2011. ITTO Technical Series.
- BROCK, A. (2015). "Love for sale": Biodiversity banking and the struggle to commodify. *Geoforum* 65 (2015) 278–290, p. 280.

- CALVO, S., MILA, H. (2009). "Manual de compostaje". Segovia: Diputacion Provincial de Segovia.
- CAMPBELL, L. M. (2002). Conservation narratives and the "received wisdom" of ecotourism: case studies from Costa Rica. *International Journal of Sustainable Development*, 5(3), 300-325.
- CEMD (2006). Biodiversity in Malaysia. Ministry of Natural Resources and Environment. Malaysia. Available at <http://www.nre.gov.my>
- CHRIST, C., HILLEL, O., MATUS, S., SWEETING, J. (2003). TOURISM AND BIODIVERSITY – Mapping Tourism's Global Footprint. Washington: Conservation International.
- CORLETT, R., PRIMACK, R.B. (2010). Tropical Rainforests: An Ecological and Biogeographical Comparison. Wiley-Blackwell, Malden.
- DSM (2006). Yearbook of Statistics Sabah. Department of Statistics Malaysia, Sabah. Available at <https://www.dosm.gov.my>
- FABEIL, N. (2013). Entrepreneurship in Rural Malaysia: An Investigation of Handicraft Producers in Sabah Region. The University of Edinburgh.
- HAYOMBE, P.O., AGONG, S.G., NYSTROM, M., MOSSBERG, L., MALBERT, B., ODEDE, F. (2012). Upscaling ecotourism in Kisumu city and its environs: local community perspective. *Int. J. Bus. Soc. Res.* 2 (7), 158-174.
- HIWASAKI, L. (2006). Community-based tourism: a pathway to sustainability for Japan's protected areas. *Soc. Nat. Resour.* 19, 675-692.
- HOLMGREN, D. (1978:2000). *Collected Writings & Presentations: For an exploration of the evolutionary limitations of tribalism in the modern world.* Article 29, *Tribal Conflict: Proven Pattern, Dysfunctional Inheritance.*
- HOLMGREN, D. (2002). *Permaculture: Principles and Pathways Beyond Sustainability.* Australia: Holmgren Design Services.

- ISLEY, J., WOOLLEY, G., LOADER, C. (2013). *Sensational Seas of Sabah*. Kuala Lumpur: Scubazoo Publications. 1<sup>st</sup> edition, pp8.
- JAINI, N., ANUAR, A. N., DAIM, M. S. (2012). The practice of sustainable tourism in ecotourism sites among ecotourism providers. *Asian Social Science*, 8(4), 175-178.
- JEAVONS, J.C. (2001). Biointensive Sustainable Mini-Farming. *Journal of sustainable agriculture*. v. 19 (2).
- KANEDA, T., BIETSCH, K. (2016). *2016 World Population Data Sheet*. Population Reference Bureau, Washington. Available at [www.prb.org](http://www.prb.org)
- KHAN, M. M. (1997). Tourism development and dependency theory: mass tourism vs. ecotourism. *Annals of Tourism Research*, 24 (4), 988-991.
- KHANAL, B.R., BABAR, J.T. (2007). Community based ecotourism for sustainable tourism development in the Mekong region. Policy Brief. 1.
- KIEW, R. (1984). Towards a Flora of Borneo. In: Ismail Sahid, Zainal Abidin A Hasan, A Latiff Mohamed & A Salam Babji (eds.), *Research Priorities in Malaysian Biology*, pp. 73-80. Penerbit Universiti Kebangsaan Malaysian, Bangi, Malaysia.
- KREUTER, M. (2014). *Horticultura Biológica Para Principiantes*. Lisboa: Editorial Presença, 3.<sup>a</sup>edição.
- LOZANO, R., LUKMAN, R., LOZANO, F.J., HUISINGH, D., LAMBRECHTS, W. (2013). Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. *J. Clean. Prod.* 48, 10-19.
- MASUD, M., ALDAKHIL, A., NASSANI, A., AZAM, M. (2016). Community-based ecotourism management for sustainable development of marine protected areas in Malaysia. *Ocean & Coastal Management* 136, 104-112.
- MAT-SALLEH, K., BEAMAN, J. (1992). Specimen database and their utilization for the Flora of Borneo. In: Ghazally Ismail, Murtedza Mohamed & Siraj Omar (eds.), *Forest biology and Conservation in Borneo*, pp. 117-137. Center for Borneo Studies, Publ. No. 2.

- MBAIWA, J.E. (2004). The socio-economic benefits and challenges of a community-based safari hunting tourism in the Okavango Delta, Botswana. *J. Tour. Stud.* 15 (2), 37-50.
- MEA (2005). *Global Assessment Report 1: Current State and Trends Assessment*. Island Press, Washington DC. Available at [www.millenniumassessment.org](http://www.millenniumassessment.org)
- MERRILL, E. (1950). A brief survey of the present status of Bornean botany. *Webbia* 7: 309324.
- MEYERS, N., MITTERMEIER, R., MITTERMEIER, C., FONSECA, G., KENT, J. (2000). Biodiversity hotspots for conservation priorities. Oxford: Macmillan Magazines Ltd. *Nature*, Vol. 403: 853-858.
- MOLLISON, B. (1988). *Permaculture: A Designers Manual*. Tyalgum, Australia: Tagari Publications, 2nd edition.
- MOLLISON, B. (1991). *Introduction to permaculture*. Tasmania, Australia: Tagari Publications.
- MOLLISON, B., HOLMGREN, D. (1978). *Permaculture One: A Perennial Agricultural System or Human Settlements*. Australia: Tagari Publications.
- MUHANNA, E. (2006). Sustainable tourism development and environmental management for developing countries. *Problems Perspect. Manag.* 4 (2), 14-30.
- NAGLE, J. C. (2009). The Effectiveness of Biodiversity Law. *Journal of Land Use and Environmental Law*, Vol. 24, p. 203.
- NORWANA, A.A.B., KUNJAPPAN, R., CHIN, M., SCHONEVELD, G., POTTER, L., ANDRIANI, R. (2011). The Local Impacts of Oil Palm Expansion in Malaysia: An Assessment Based on a Case Study in Sabah State. CIFOR.
- PAULL, J. (2011). The making of an agricultural classic: farmers of forty centuries or permanent agriculture in China, Korea and Japan, 1911-2011. *Institute of Social and Cultural Anthropology, University of Oxford, Oxford, UK.* Vol.2, No.3, 175-180.



PFEIFER, M., KOR, L., NILUS, R., TURNER, E., CUSACK, J., LYSENKO, I., KHOO, M., CHEY, V., CHUNG, A.C., EWERS, R.M. (2015). Mapping the structure of Borneo's tropical forests across a degradation gradient. *Remote Sensing of Environment* 176 pp 84–97.

REYNOLDS, G., PAYNE, J., SINUN, W., MOSIGIL, G., WALSH, R. P. (2011). Changes in forest land use and management in Sabah, Malaysian Borneo, 1990–2010, with a focus on the Danum Valley region. *Phil. Trans. R. Soc. B* 366, 3168–3176.

RISTESKI, M., KOCEVSKI, J., ARNAUDOV, K. (2012). Spatial planning and sustainable tourism as basis for developing competitive tourist destinations. *Procedia - Social and Behavioral Sciences*, 44, 375-386.

RODRIGUES, M. (2006). “Compostagem Doméstica – Guia Prático”. Alcácer do Sal: APASADO.

Sarawak Report (2012). UK Press Reports “Diplomatic Row” Over William & Kate’s Sabah Visit. Kuching, Malaysia. Available at [www.sarawakreport.org/2012](http://www.sarawakreport.org/2012)

SODHI, N. S., KOH, L. P., BROOK, B. W., NG, P. K. L. (2004). Southeast Asian biodiversity: An impending disaster. *Trends in Ecology & Evolution*, 19, 654–660.

STEENIS, C. (1950). The delimitation of Malaysia and its main geographical division. *Flora Malesiana* 1, 1: LXX -LXXY.

TEO, A. (2011). *Sabah - Land of the sacred mountain*. Kota Kinabalu: Sabah Handicraft Center. 7<sup>th</sup> edition, pp 8-17

TIA (2003). The Geotourism Study - Phase I Executive Summary. National Geographic,

Traveler. Available at [www.ustravel.org](http://www.ustravel.org)

TIES (2006). TIES Global Ecotourism Fact Sheet. Washington, USA. Available at [www.ecotourism.org](http://www.ecotourism.org)

TOH, S.M., GRACE, K.T. (2006). Case Study: Sabah Forest Ownership for Food and Agriculture Organization of the United Nations. Global Forestry Services Inc.

UMANN, M. (2014). *Permacultura? Curso de Introdução*. Loures: Fértil Caos Editora.

UNEP (2011). Towards a Green Economy: pathways to Sustainable Development and Poverty Eradication. United Nations Environment Programme. Available at [www.uneptie.org](http://www.uneptie.org)

UNEP (2001). UNEP manual for the international year of ecotourism. Pp. 1-18. Available at [www.uneptie.org](http://www.uneptie.org)

UNWTO (2015). Tourism Highlights. Available at <http://www.e-unwto.org>

UNWTO (2016). UNWTO Annual Report 2016. Available at <http://www.e-unwto.org>

VETETO, J., LOCKYER, J. (2008). Environmental Anthropology Engaging Permaculture: Moving Theory and Practice Toward Sustainability. *Culture & Agriculture* Vol. 30, Numbers 1 & 2 pp. 47–58.

VICENTE-MOLINA, M.A., FERNANDEZ-SAINZ, A., IZAGIRRE-OLAIZOLA, J. (2013). Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries. *J. Clean. Prod.* 61, 130-138.

WEAVER, D. (2002). Asian ecotourism: patterns and themes. *Tourism Geographies*, 153–172. George Mason University, USA.

WANGA, J.O., HAYOMBE, P.O., ODUNGA, P.O., ODEDE, F.Z. (2013). The Nexus between environmental knowledge and ecotourism attitude among the local youths in Co-educational Secondary Schools in Bondo Sub-County, Siaya County, Kenya. *Int. J. Bus. Soc. Res.* 3 (7), 103-116.

WULFFRAAT, S. (2014). WWF Report – The environmental status of the Heart of Borneo. WWF's HoB Initiative.

WWF (2001). Guidelines for Community-Based Ecotourism Development. WWF International, Switzerland. Available at [www.worldwildlife.org](http://www.worldwildlife.org)

WWF (2007). Forest Area Key Facts & Carbon Emissions from Deforestation. Available at [www.worldwildlife.org](http://www.worldwildlife.org)

ZHANG, H., LEI, S.L. (2012). A structural model of residents' intention to participate in ecotourism: the case of a wetland community. *Tour. Manag.* 33 (4), 916-925.

## Appendix

**Table 8** - Homestay personal evaluation (1 to 5 stars)

	Mr. Ben & Mrs. Nuria	Mr. Jumadi & Mrs. Ester	Mr. Feridin & Mrs. Diana	Mr. Saidin & Mrs. Joviña	Mr. Maratin & Mrs. Rosena	Mr. Paladins & Mrs. Felixcia	Mr. James & Mrs. Salahoi
<b>Family</b>	*****	*****	*****	*****	*****	*****	*****
<b>Hospitality</b>	****	***	****	*****	*****	****	*****
<b>Cleanliness</b>	*****	***	****	*****	*****	****	*****
<b>Room equipment</b>	****	**	****	****	*****	*	****
<b>Bed/Mattress</b>	*****	**	***	*****	****	**	***
<b>Bathroom/Toilet</b>	*****	*****	*****	*****	*****	*****	*****
<b>Food/Dishes</b>	*****	*****	*****	*****	*****	*****	*****

**Table 9** - Personal schedule: Homestay experience

<b>Date</b>	<b>Morning activity</b>	<b>Afternoon activity</b>
25/10/16		- Late arriving
26/10/16	<ul style="list-style-type: none"> <li>- Mr. Ben welcoming</li> <li>- Family interview</li> <li>- Walking tour: Mantob and Dumpiering</li> </ul>	<ul style="list-style-type: none"> <li>- Introduction to the project and details arrangement</li> <li>- <i>Tuaran</i> city shopping</li> <li>- <i>Tamparuli</i> Market</li> </ul>
27/10/16	<ul style="list-style-type: none"> <li>- <i>Gaman Kapur</i> Trekking</li> <li>- River swimming</li> </ul>	<ul style="list-style-type: none"> <li>- Traditional costume photo shoot: <i>Unduk Ngadau</i></li> </ul>
28/10/16	<ul style="list-style-type: none"> <li>- Traditional songs exchange</li> <li>- Mrs. Ester welcoming</li> <li>- Walking tour: Farmstay</li> </ul>	<ul style="list-style-type: none"> <li>- Fish feeding</li> <li>- Adventure Center Park visit</li> </ul>
29/10/16	<ul style="list-style-type: none"> <li>- Seventh Adventist church worshipping day</li> <li>- Community lunch</li> </ul>	<ul style="list-style-type: none"> <li>- Mrs. Diana welcoming</li> <li>- Family interview</li> <li>- Board game</li> <li>- Muslim traditional costume</li> </ul>
30/10/16	<ul style="list-style-type: none"> <li>- <i>Sinuripan</i> waterfall trekking</li> </ul>	<ul style="list-style-type: none"> <li>- Vegetables harvesting</li> <li>- River Tubbing</li> <li>- Show cooking</li> </ul>
31/10/16	<ul style="list-style-type: none"> <li>- Mrs Jovina welcoming</li> <li>- Family interview</li> </ul>	<ul style="list-style-type: none"> <li>- Walking tour: Pinagon</li> <li>- Vegetables harvesting</li> <li>- Show cooking</li> <li>- Rice traditional pounding and sieving</li> <li>- Rubber tapping</li> <li>- Blowing pipe (<i>Sumpit</i>)</li> </ul>
01/11/16	<ul style="list-style-type: none"> <li>- Local medicinal plants recipes</li> </ul>	<ul style="list-style-type: none"> <li>- Church worshipping</li> </ul>

	<ul style="list-style-type: none"> <li>- Vegetables harvesting</li> <li>- Show cooking</li> </ul>	<ul style="list-style-type: none"> <li>- Food forest harvesting</li> </ul>
02/11/16	<ul style="list-style-type: none"> <li>- Catholic church worshipping</li> </ul>	<ul style="list-style-type: none"> <li>- BET meeting</li> <li>- Mr. Martin welcoming</li> <li>- Old family pictures</li> <li>- Family interview</li> </ul>
03/11/16	<ul style="list-style-type: none"> <li>- Paddy field trekking</li> <li>- River net fishing</li> </ul>	<ul style="list-style-type: none"> <li>- Jungle trekking (4h)</li> </ul>
04/11/16	<ul style="list-style-type: none"> <li>- Meeting with Alan</li> </ul>	<ul style="list-style-type: none"> <li>- Mrs. Felixcia Welcoming</li> <li>- Traditional drinks taste</li> </ul>
05/11/16	<ul style="list-style-type: none"> <li>- Hill Paddy trekking</li> <li>- Durian tree planting</li> <li>- Show cooking</li> </ul>	<ul style="list-style-type: none"> <li>- Tour around Kiulu Kg.</li> <li>- Big Foot Point visit</li> <li>- Fruit harvesting</li> <li>- Mr. James welcoming</li> <li>- Family interview</li> </ul>
06/11/16	<ul style="list-style-type: none"> <li>- Church worshipping</li> <li>- Mrs. Felixcia welcoming</li> </ul>	<ul style="list-style-type: none"> <li>- Presentation to Lembah Embun communities</li> <li>- Practical app: Compost pile</li> <li>- Languages exchange</li> </ul>
07/11/16	<ul style="list-style-type: none"> <li>- Free time</li> </ul>	<ul style="list-style-type: none"> <li>- Mr. Martin welcoming</li> <li>- Kiulu religious celebration</li> <li>- Traditional dancing, singing and experiences sharing</li> </ul>
08/11/16	<ul style="list-style-type: none"> <li>- Visit to swallow bird artificial cage</li> <li>- Banana shoot planting</li> <li>- Farewell</li> </ul>	<ul style="list-style-type: none"> <li>- Back to KK</li> </ul>

**Table 10** – Homestay families’ questionnaire

Family	Mr. Ben & Mrs. Nuria	Mr. Jumadi & Mrs. Ester	Mr. Feridun & Mrs. Diana	Mr. Saidin & Mrs. Jovita	Mr. Maratin & Mrs. Rosena	Mr. Paladius & Mrs. Felixcia	Mr. James & Mrs. Salahoi
Age	53/51	52 / 43	47 / 44	48 / 41	53 / 49	47 / 42	72 / 67
N.° Children	5	2	4	3	4	2	5
N.° Ppl. per house	5	5	10	5	3	5	2
Main income	Homestay Rubber Tapping Homemade pastry	Government job Rubber Tapping Homemade pastry	Security guard job Fruit selling Rubber Tapping	Fruit/vegetables selling Rubber tapping BET (tour guide)	Government job Fruit/vegetables selling Rubber Tapping	Rubber Tapping Fruit/vegetables selling Grocery shop	Rubber Taping Fruit/vegetables selling
Paddy field	For own consume	For own consume	For own consume	For own consume	For own consume	For own consume	For own consume
Chemical use	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Seed collection	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Animal production	No	No	Chicken	Chicken Buffalo (to sell)	No	Fish pond (own consume)	Chicken
Recycling	No	No	No	Yes (partially)	No	No	Yes
Organic waste separation & use	Yes: thrown to the land	Yes: thrown to the land	Yes: around banana plants	Yes: to feed buffalos	Yes: thrown to the land	Yes: thrown in the fish pond	Yes: around flowers
Composting	No	No	No	No	No	No	No
Grey water system	No	No	No	No	No	No	No
Building	Cement, wood and zinc	Cement, wood and zinc	Cement, wood and zinc	Cement, wood and zinc	Cement, wood, zinc and bamboo	Cement, wood and zinc	Cement, wood and zinc

**Table 11** – Problems, causes and solutions in domestic compost

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Slow process	Excess of brown material or pieces are too big	Add green material
		Cut the material in smaller pieces
		Move the compost pile
Rotten smell	Excess of humidity	Move the pile more often
	Excess of green matter	Add brown matter
	Compaction	Move the pile or decrease its size
Low temperature	Small pile	Increase its size
	Insufficient humidity	Add water (watering can) when you move the pile or cover it
	Insufficient aeration	Move the pile
	Lack of nitrogen	Add green material
	Cold weather	Increase the size of the pile or cover it with straw
High temperature	Big pile	Decrease its size
	Insufficient aeration	Move the pile
Plagues	Presence of meat scraps, fish, bones, sauces or grease	Remove this type of food from the pile and cover it with a layer of soil or brown material
	Presence of ants	The pile is too dry: water it

Adapted from Rodrigues, 2006



**Table 12 - Evaluation form**

**Evaluation measure:** 1 to 5 points

1 – unsatisfactory; 2 – poorly satisfactory; 3 – satisfactory; 4 – very good; 5 – excellent.

<b>Contestant:</b>			
<b>Criteria</b>			<b>Score</b>
Waste management	Recycling	Procedure	
	General waste	Procedure	
	Composting	Procedure	
		Creativity	
		Tidiness	
Greywater system	Banana treatment - Banana/papaya circle - Banana plant	Procedure	
		Creativity	
		Tidiness	
General look	Garden and surrounding area House overview	Cleanliness	
		Decoration	
		Beauty	
<b>Total score</b>			