Chapter 3

Basic Concept and Assumptions for Preparation of Master Plan

3.1 Vision and Approach Method

3.1.1 Vision

Temburong district will be a model next-generation eco city. As part of the rich ecosystem of Borneo island, Temburong should represent an urban system where nature and human life co-exist in harmony. Planning should include tourism, nature preservation, and other local elements.

Urban development to date has destroyed nature, local communities, and other historical elements, but this project will seek to preserve these elements and create a harmonious balance between them. To build such a sustainable ecosystem, this eco master plan focuses on the relationship between urban development, preservation of local elements, and Borneo's natural environment. The vision is a 'showcase of a carbon-neutral society for Borneo wildlife preservation' (Figure 3.1).

Figure 3.1: Eco Master Plan Vision of Temburong

Source: Study team.

3.1.2 Approach Method

How should we approach building a sustainable ecosystem?

We used three methods to design Temburong district.

(1) Living Lab

(2) Carbon-neutral

(3) Learning Tourism

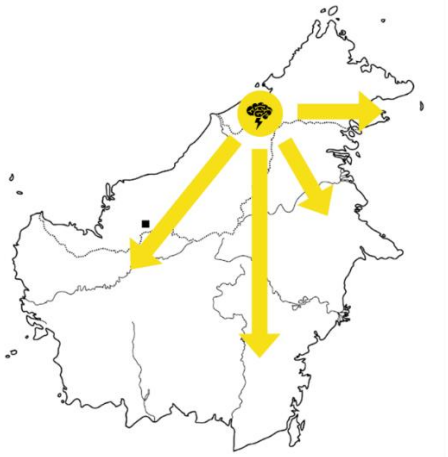
(1) Living Lab

Temburong district will be a 'living lab' of a carbon-neutral city. A living lab is a user-centered, open-innovation ecosystem, often operating in a region, integrating concurrent research and innovation processes within a public–private–people partnership.[1]

The concept is based on a systematic user co-creation approach, integrating research and innovation processes through the co-creation, exploration, experimentation, and evaluation of innovative ideas and technologies in real-life cases. Temburong district will apply cutting-edge eco-technologies to people's lives and evaluate their contribution to an eco-lifestyle.

The style of Temburong district development itself will be a showcase of innovation, such as future technology of energy and human lifestyles in the abundant forest, especially for the urban development on Borneo Island.

Figure 3.2: Temburong's Eco-Friendly Innovation Informs Borneo Island



Source: Study team.

[1] LIVING LABs http://s3platform.jrc.ec.europa.eu/documents/20182/117542/S2E_Fiche_Living_Labs.pdf/994eafb3-4393-415b-a36d-d8cf6f33d44c

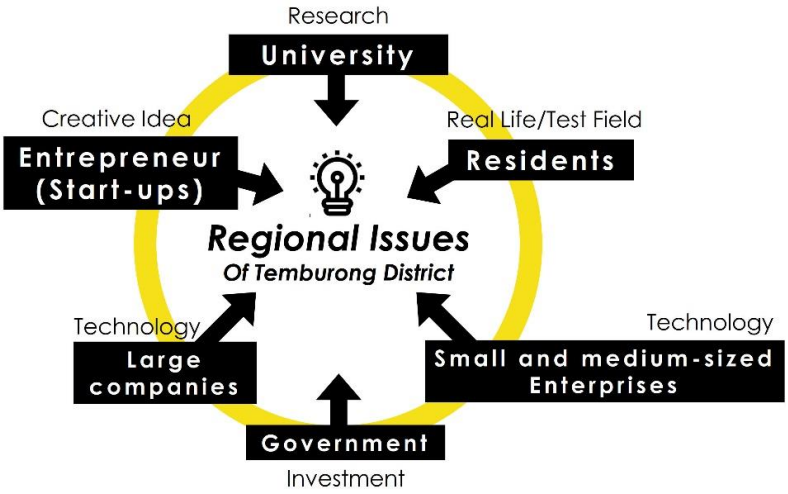
i) Diverse Community

Temburong will be the R&D flagship for Borneo's wildlife preservation. Creating innovation via a living lab will require interacting with various people to share regional issues and create solutions. Collaboration will include researchers, entrepreneurs, local residents, and government staff, as well as other sources of innovation.

Urban planning considers how to create diverse communities in terms of function and land use plan as follows:

- Housing
- University
- Company office (R&D center)
- Office for start-up company
- Government office
- Public service

Figure 3.3: Diverse Communities in Temburong



Source: Study team.

ii) Creative Work/Life Style

To achieve innovation, workers in Temburong district must be creative. To make people creative, it is important to have the opportunity to get various and cutting-edge information.

This study considers how to create these connections in daily life and aims to build a future society in which different people live together, share values, and seek solutions to regional issues.

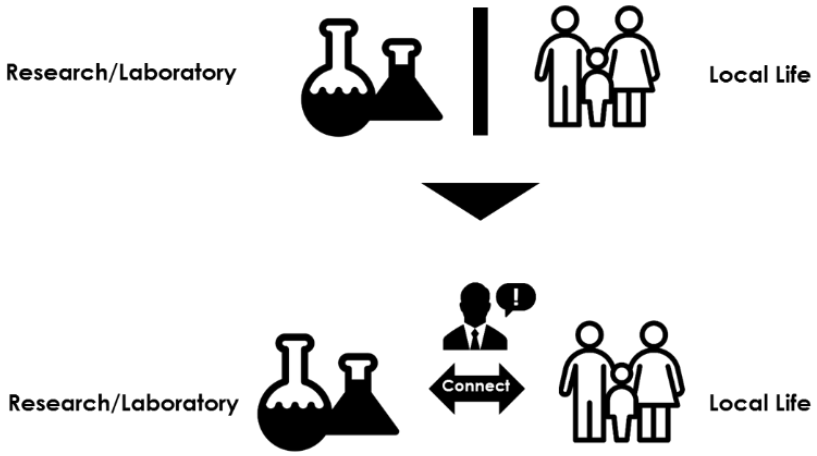
In urban planning, we propose (i) creating a place where research and local life meet; (ii) R&D

and educational facilities with public spaces; and (iii) a forest creative village, satellite R&D office or unexplored region resort.

- **Creating a place where research and local life meet**

Instead of separating new elements from established local components in urban development, this study advocates embedding new elements within local life to lead to new discoveries and encounters. This will encourage innovation and foster a plan–do–check–act (PDCA) cycle for the resolution of regional issues, which will enable long-term giving back to the local community.

Figure 3.4: Connection between Research and Local life



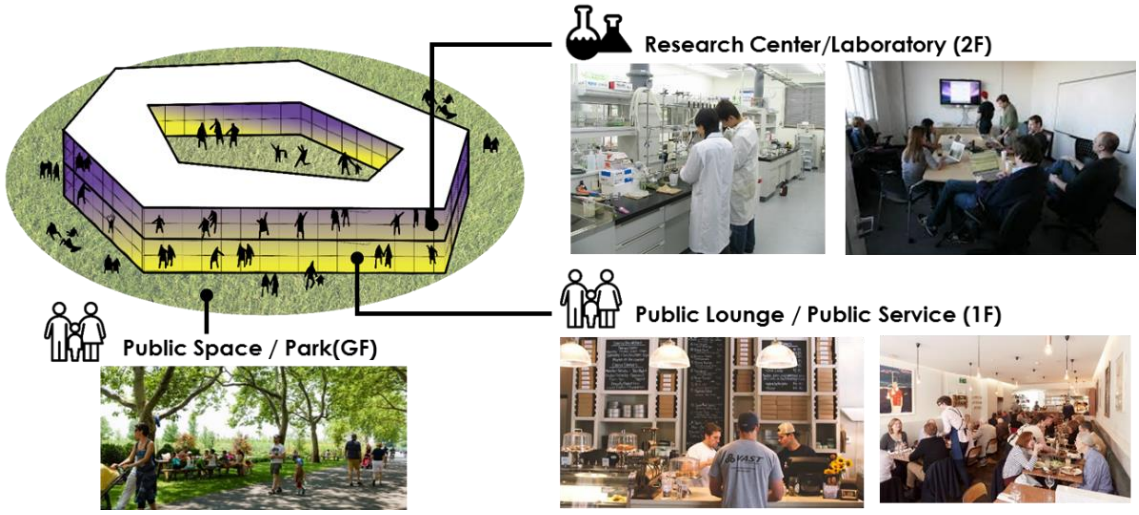
Source: Study team.

- **R&D and educational facilities with public spaces**

This study recommends developing facilities and spaces, mixed with research functions and public services, as regional cores. One proposal of this public space is shown for Public Space between R&D and University in Urban Design Image Labu Estate Growth Centre in Figure 4.18

- Create a gallery space, open to the community, for research activities in the laboratory.
- Establish contact points between R&D and local life, to establish a co-creative relationship

Figure 3.5: R&D and Educational Facility with Public Space



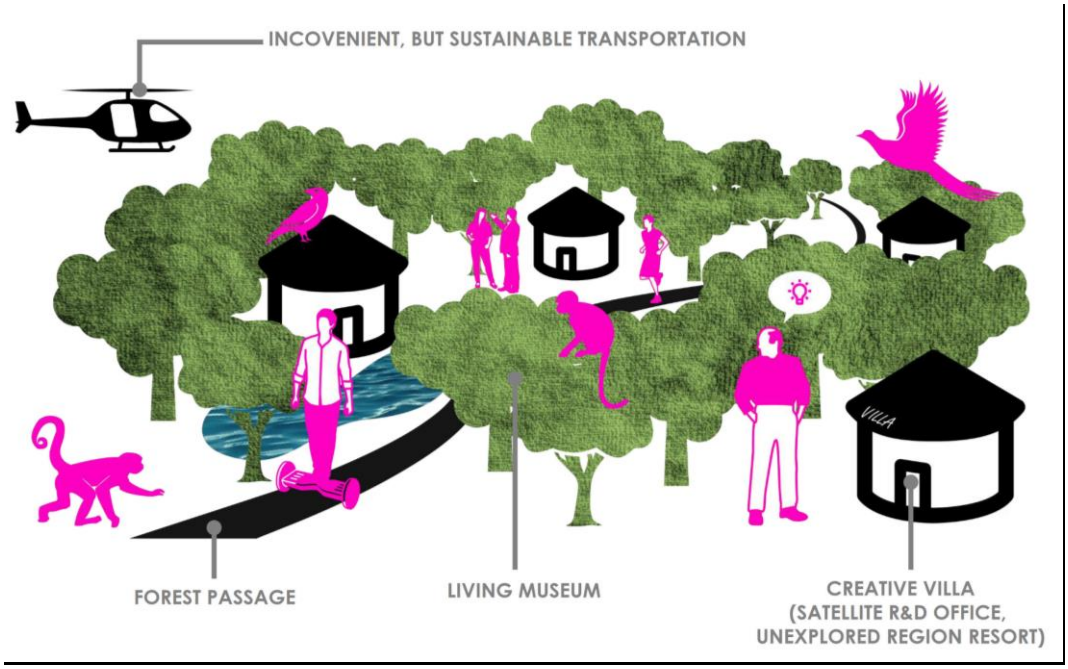
Source: Study team.

- **Forest creative village**

A working environment surrounded by nature is stimulating for researchers and workers.

The forest creative village such as satellite R&D office or unexplored region resort, aims to leverage the power of nature to foster innovation, discovery, and creativity.

Figure 3.6: Forest Creative Village

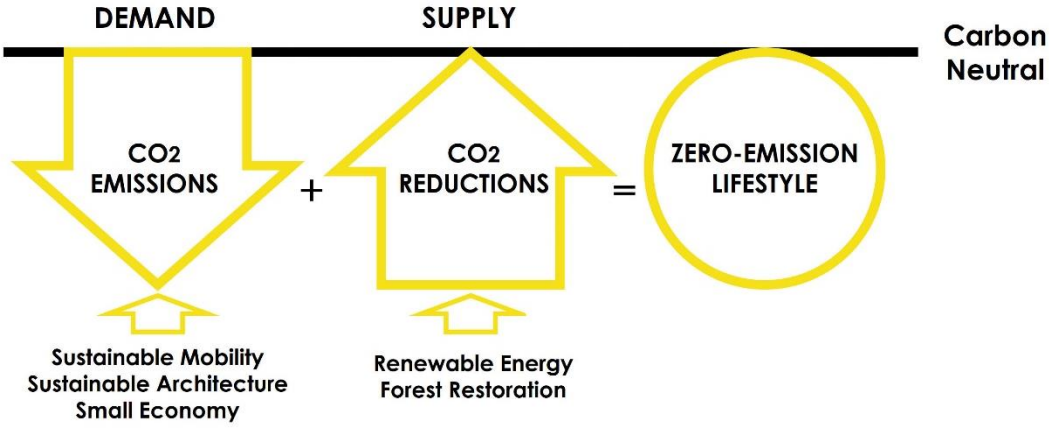


Source: Study team.

(2) Carbon-neutral

Temburong district will be the most advanced eco city in the world, aiming at zero carbon dioxide (CO_2) emissions. This study proposes the following policies to balance circulation energy supply and demand; (i) renewable energy, (ii) a sustainable mobility system, (iii) sustainable architecture/agroforestry, and (iv) a small economy. The Dialogue of Carbon Neutral Development is shown in Figure 3.7.

Figure 3.7: Dialogue of Carbon Neutral Development



Source: Study team.

i) Renewable energy

Temburong district will be entirely powered by renewable energy. It will pioneer innovative technology such as solar, wind, biomass, and hydrogen energy.

ii) Sustainable mobility system

People usually require a significant amount of energy to move around urban areas. We need to consider a sustainable mobility system to minimise the energy consumption caused by movement. For example, hydrogen-powered buses (CO_2 zero) could bring tourists from BSB to Temburong district and tourists could travel around in Temburong in hydrogen-powered autonomous cars.

iii) Sustainable architecture and agroforestry

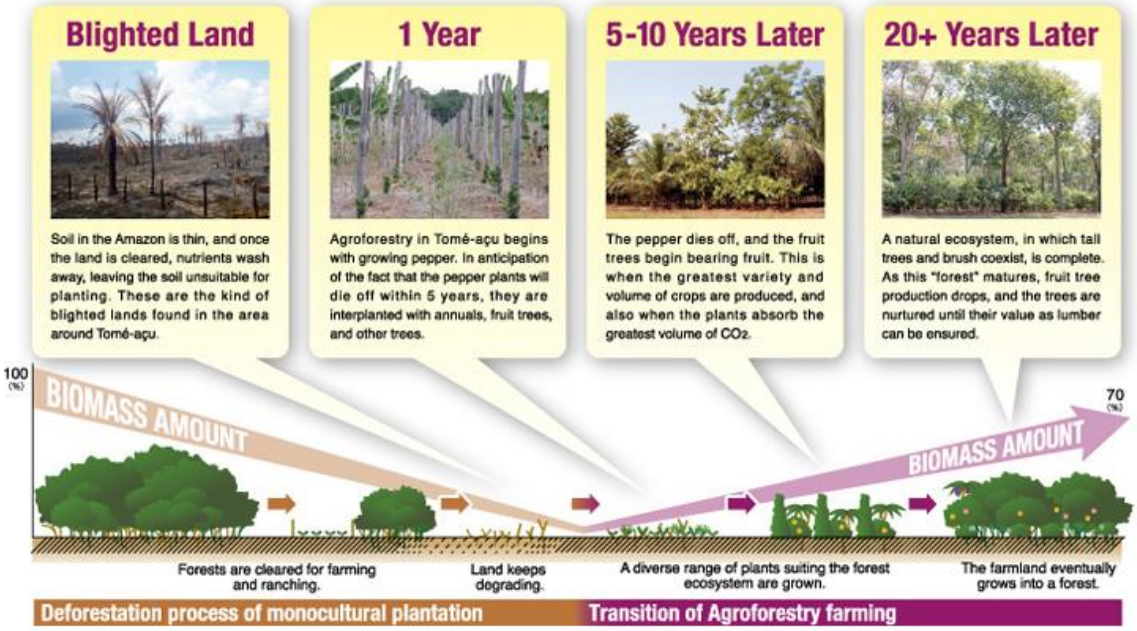
- **Sustainable architecture**

To achieve zero CO_2 emissions, the energy impact of housing and other facilities must be minimised with a sustainable architecture system. Renewable energy, such as solar and hydrogen power, are very effective for CO_2 reduction. This study recommends introducing net zero emissions houses or a house energy management system. Advanced technologies adapted to Brunei's climate will be introduced to the architectural system.

- **Agroforestry**

Food production is one of the most important issues. A self-sufficient food production and consumption system is crucial in the region. This study proposes agroforestry, a land use management system in which trees or shrubs are grown around or amongst crops or pastureland (Figure 3.8). This helps balance food production and nature preservation.

Figure 3.8: Agroforestry



Source: Fruta Fruta. https://www.frutafruta.com/global/agroforestry/agroforestry.html, "Agroforestry is a method of farming on lands devastated by logging and other activitiy that builds on the example of natural ecosystems to enable a wide range of agricultural products to co-exist."

iv) Small economy

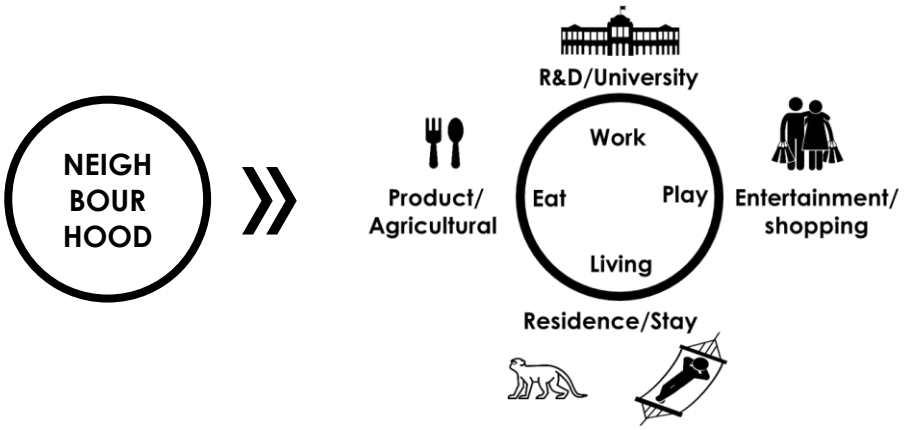
In an era of unpredictable social change, a small regional flexible city which grows gradually through self-sufficiency is in demand rather than a mega city built on a large amount of investment (Figure 3.9).

Figure 3.9: Self-Sufficient Circulation

Source: Study team.

Various uses–housing and offices, shopping malls, and a university–can co-exist in one unit of a small district. This creates a compact city and neighborhood community (Figure 3.10).

Figure 3.10: Compact City

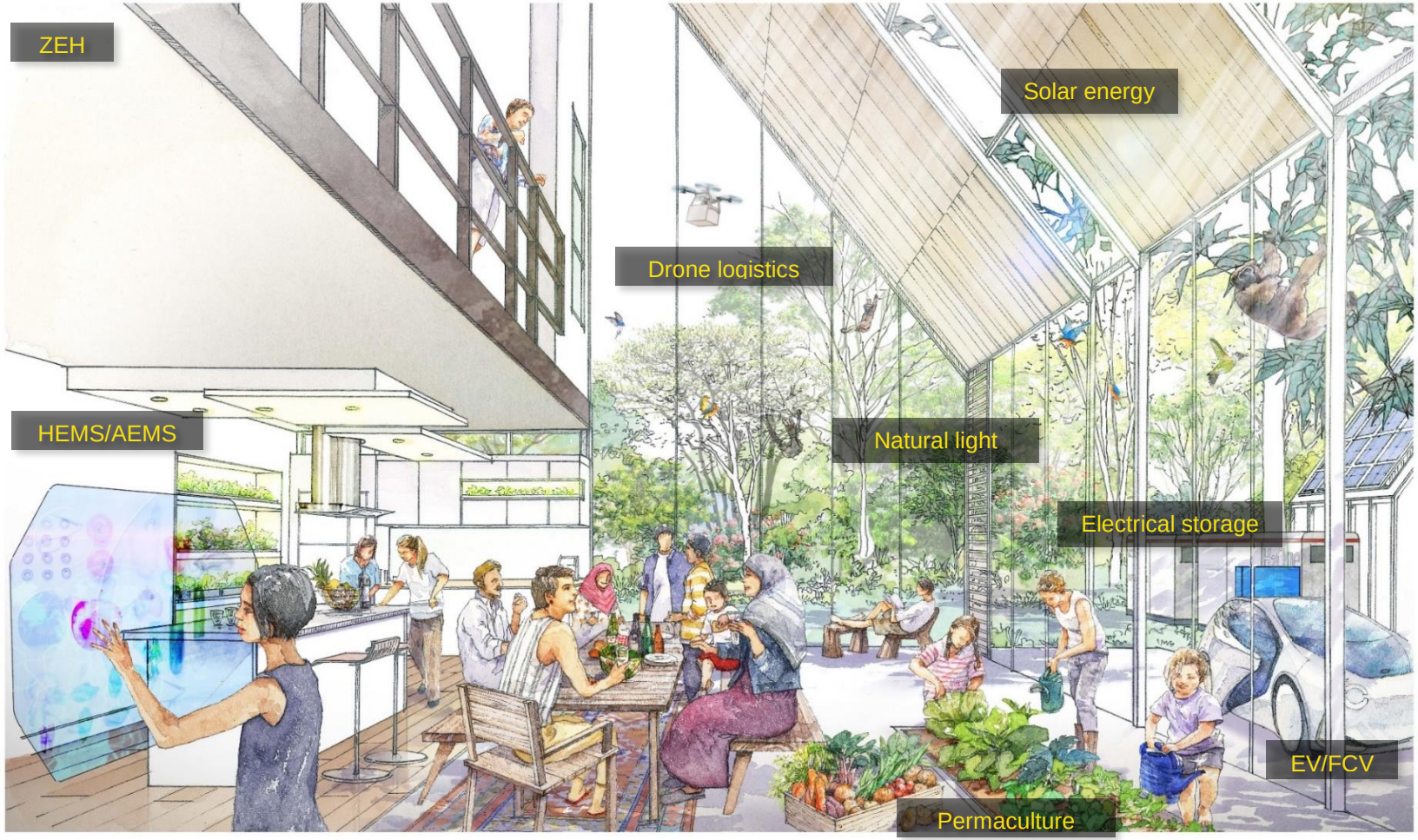


Source: Study team.

Establish a new eco-friendly lifestyle for Temburong district, this study proposes a self-sufficient city model with many elements of small unit circulation (e.g. circulation of industry, market, energy or food).

With an advanced eco-friendly lifestyle, which does not exist in western countries or Japan, Temburong district will establish itself as a brand name in advanced city environments in Brunei and all of Southeast Asia.

Figure 3.11: Eco-Friendly Lifestyle in Temburong



AEMS = area energy management system, EV = electric vehicle, FCV = fuel cell vehicle, HEMS = home energy management system.
Source: Study team.

(3) Learning Tourism

In Brunei, it is the immediate goal to create a new industry ahead of natural resources, especially development of the tourism industry is important. In Temburong, we propose not only sightseeing just to visit but also incorporating learning and education as tourism resources with the characteristics of the area. In other words, tourism here means learning about Borneo's nature and the future.

i) Feature of Temburong and Borneo

Temburong has a rich natural environment, with mangroves and sea. Living in Temburong permits access to the natural ecology and environmental problems, offering an abundant learning environment. Both tourists and residents can improve their environmental awareness. By changing the awareness and mindset of people living here, Temburong will become a truly environmental city.

This study promotes the idea that humans are part of the species in the ecosystem. We want to create a new eco-friendly lifestyle in Temburong which emphasises the co-living of humans and other species, leading to a society that co-exists with Borneo's great nature.

Figure 3.12: Learning Activities in Forest Area

Source: #GoTemburong Holiday Packages
http://www.geekinwhite.com/travels/2016/11/16/gotemburong-holiday-packages

Source: Borneo Insider's Guide
http://borneoinsidersguide.com/education-fun-come-together-sumbiling-eco-village-school-camp-brunei/

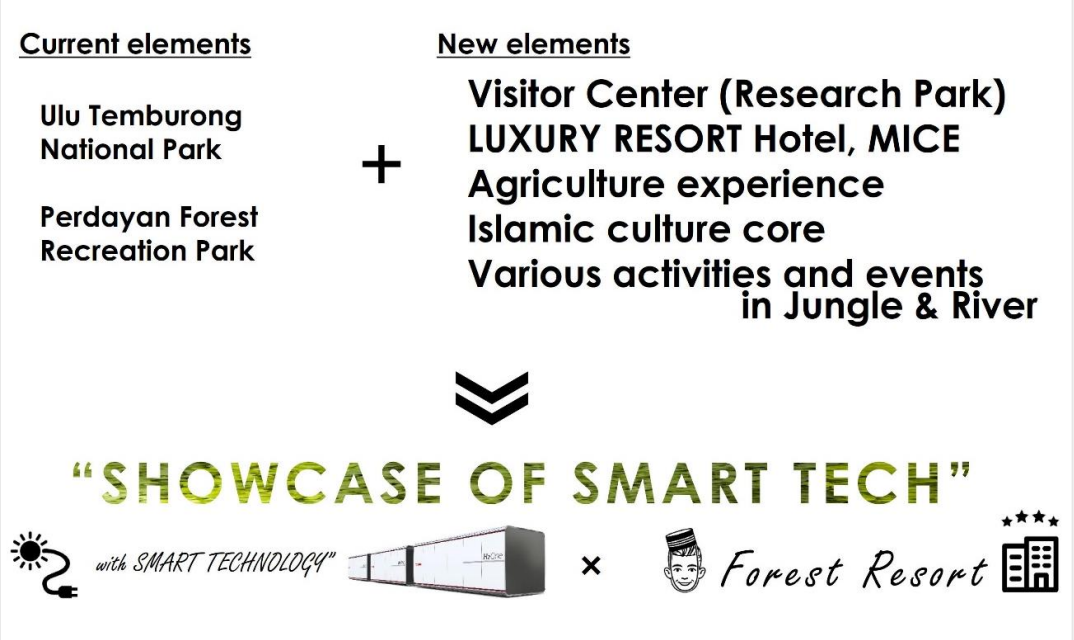
ii) Smart technology showcase

Temburong will symbolise smart technology, and tourists and locals will be able to discover ecology through daily experience with advanced smart technologies.

As the base for ecological learning, we will build a resort high in the forest which will allow people to immerse themselves in nature, away from hustle and bustle of daily life. The resort will offer the rare experience to live in very close proximity with the forest and the creatures who live there. This will attract many visitors with high awareness of the environment.

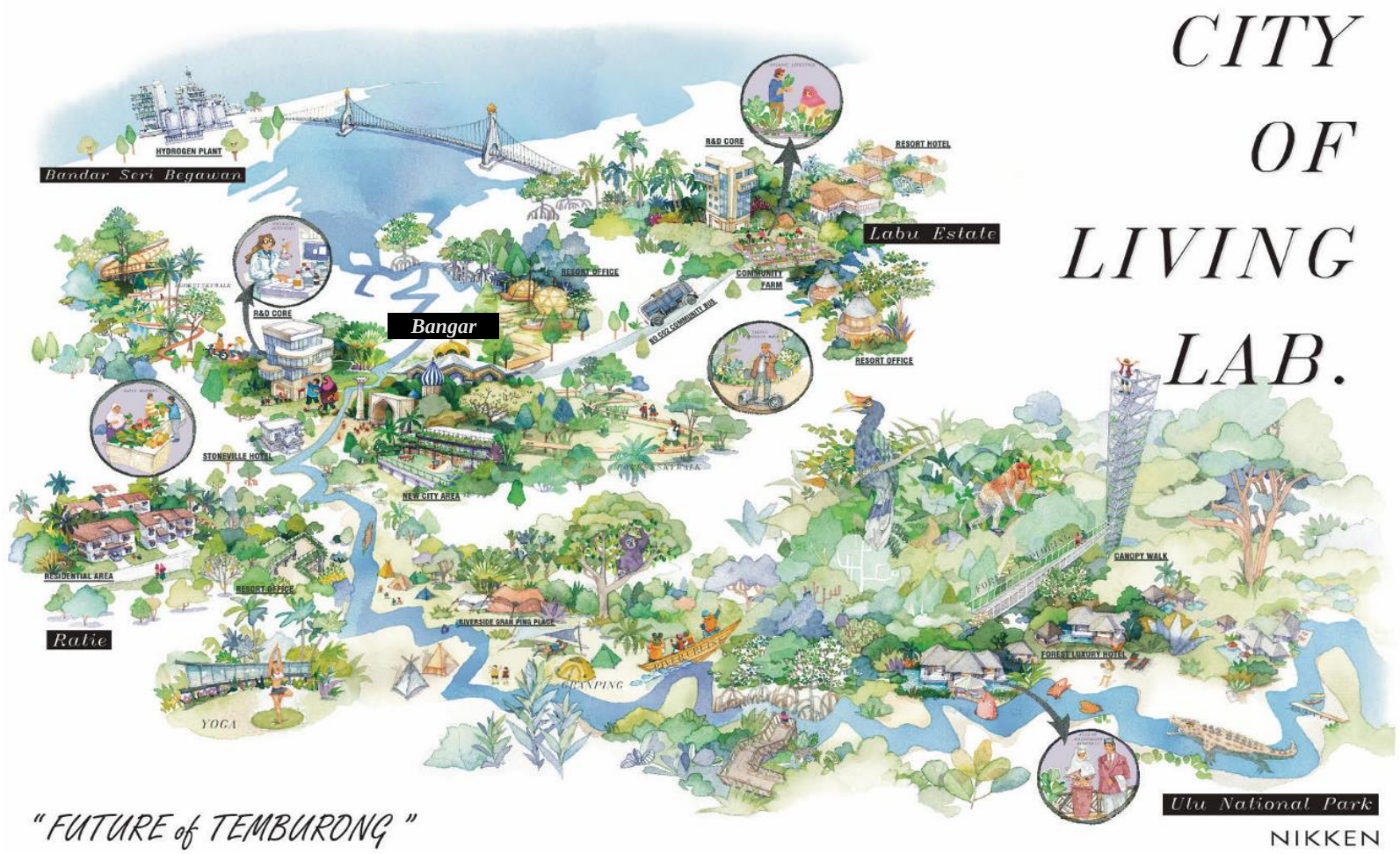
We will build many small individual structures to minimise destruction of the forest. This will allow everyone to enjoy their stay while experiencing the true delights of the forest.

Figure 3.13: Learning Tourism Elements and Smart Technology Showcase



MICE = meeting, incentive, conference, and exhibition.
Source: Study team.

Figure 3.14: Future of Temburong



Source: Study team.

3.2 Target of Master Plan in Temburong District

To realise the vision and to avoid uncontrolled development by the private sector, this study formulates a land use plan and urban design image in the master plan (Chapter 4).

The target year of the master plan is 2030, 10 years after 2020, when the world's first international hydrogen supply will begin between Brunei and Japan, and the bridge connecting BSB and Temburong will open. The short-term target will be 2024, when the Asia-Pacific Economic Cooperation (APEC) Economic Leaders' Meeting will be held in Brunei.

3.3 Facilities to be Introduced

Based on the vision, goal and approach method and the Temburong District Plan, 2006–2025, the main facilities to be introduced to the planning site are as follows:

- University, R&D
- Hotel, convention centre zone
- Hospital zone
- School zone
- Residential zone
- Commercial zone
- Public services zone
- Tourism zone

3.4 Selection of Suitable Location for Development Hub

Bangar and Labu Estate are positioned as growth centres, considering the new bridge that will open between BSB and Temburong.

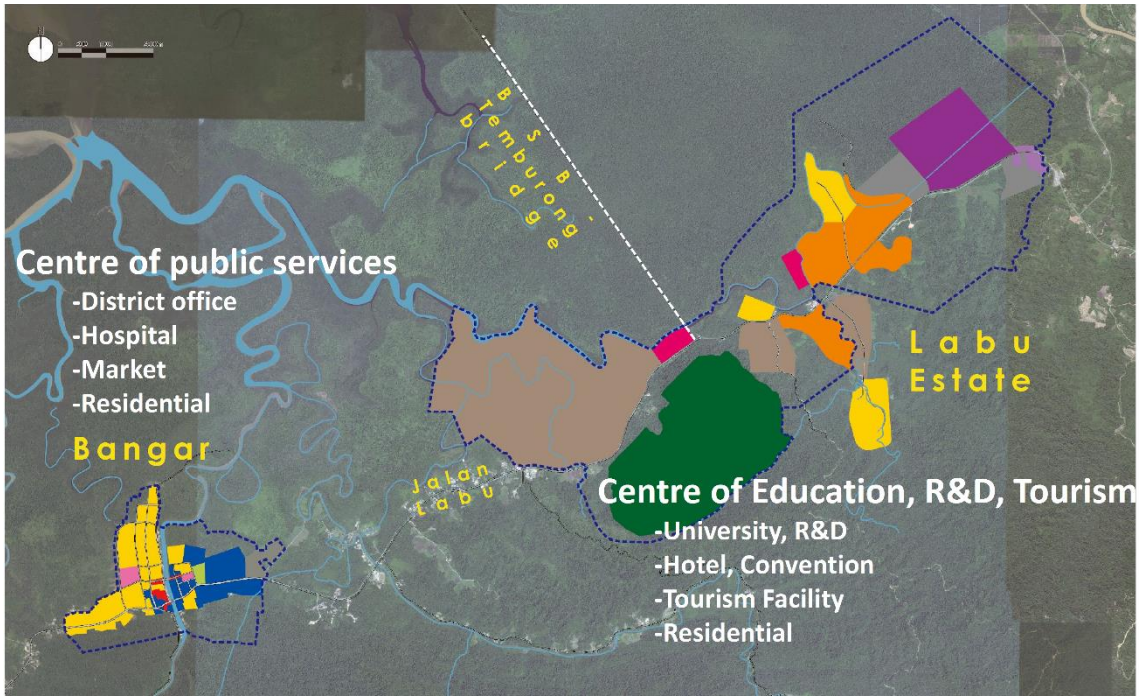
As shown in Figure 3.15, Bangar will have functions such as district office, hospital, market, and residential, as the centre of public services. Labu Estate will have functions such as the university, R&D, hotel, convention, tourism facilities, and residential, as the centre of education, R&D, and tourism.

3.5 Framework of Residential Population and Tourist Population

3.5.1 Framework of Residential Population

Considering the new bridge connecting BSB and Temburong, the development of Sultan Sharif Ali Islamic University (UNISSA) and R&D, the annual population growth rate is projected at 5%.

Figure 3.15: Suitable Location for Development Hub



Source: Study team.

Table 3.1: Temburong Population

Item	Amount
Population in 2016 (number of persons)	9,000
Growth rate (%)	5
Population in 2030 (number of persons)	17,819
Population growth (number of persons)	8,819

Source: Study team.

Table 3.2: Bangar Population

(number of persons)

Item	Amount
Population in 2017	2,395
Population in 2030	6,395

Source: Study team.

Table 3.3: Labu Estate Population

(number of persons)

Item	Amount
Population in 2017	582
Population in 2030	4,582

Source: Study team.

3.5.2 Framework of Tourist Population

The tourism area should be expanded not only to Ulu Temburong National Park but also to Perdayan Forest Recreation Park and Labu Estate. The target number of tourists is 400,000 per year.

Table 3.4: Labu Estate Tourist Population

Area	Activity	Number of tourists (people/day)
Ulu Temburong National Park	Canopy walk, camping, trekking, fishing, kayaking	500
Perdayan Forest Recreation Park	Boat tour	300
Labu Estate	Nature amusement park, agro park, learning tourism	300
Total		**1,100** = 400,000 people/year

Source: Study team.