Sustainability Alliance of Urban Networks in Asian Cities
SAUNAC
-

Work package 1

NATIONAL SELF-ASSESSMENT REPORT

and

PLAN FOR THE PLACEMENT OF THE SSVC COURSE

Lead by HAW and VNU-HUS

Contents

Abstract

Vietnam is a developing country in South East Asia with a total population of 94,952,080 inhabitants in 2017 (United Nations). The urbanization process has been strongly speeded up with the influences of the reform policy and open door market oriented economy since 1986. Nowadays exist 788 cities and towns, including five major cities, which belong to the central government.

During period of renovation, Vietnam has been successful in generating rapid economic growth. It was the key issue of population and development and caused threats to the environment. In order to get advantages of potential positive impacts and minimize the negative effects of urbanization and population development to the environment, it is necessary to integrate environmental planning and spatial planning to steer the development process.

This report aims at clarifying environment and urban development issues related to spatial planning as well as current urban planning law of Vietnam in 2009. The authors will figure out the connection between population growth, cities development and the environmental quality, determine the gaps in environmental planning and spatial planning and recommend appropriate measures to fill the gaps.

The result of this work show that there are many environmental challenges in Vietnam, which includes sanitary water supply shortage, lack of waste water treatment plants, increasing solid waste generation, air pollution in cities, land use changes causing loss of green areas and agriculture land, old public transport system etc. Besides, the environmental data are fragmented and overlap each other; there is not any unified environmental information system for sharing and managing data.

City development has a close connection with socio-economic planning; spatial planning; natural resource management and integrated land use; infrastructure systems, and governance frameworks. It is done through strategic environmental assessment (SEA) in the course of urban planning to protect the environment.

Due to weaknesses in profession and education on environmental and urban planning in Vietnam several aspects can be identified: The responsibilities for urban planning in Vietnam are fragmented between ministries and between the different levels of government. The planning system is unnecessarily complex, bureaucratic, and highly centralized. Laws and decrees that guide the administrative procedures are ambiguous, out-dated, and impractical. Collaboration between agencies involving plan preparation and implementation is poor. Environmental and urban planners are considered as architects, engineers, or in some cases, economists. There is no professional registration or certification of urban planners because of the absence of education programs in environmental and urban planning.

Strengthening the capacity of institutions on urban planning is critical to improve the urban development in Vietnam, to meet the challenges of rapid urbanization and the transition to a market oriented economy – following the Vietnam Urban Development Orientation and Strategy with Vision toward year 2050 of Prime Minister of Vietnam. The new approach of urban planning technique– zoning planning, which was introduced in new Urban Planning Law, is discussed in this work.

1. Introduction

The first urban settlements in Vietnam established more than 2,000 years ago. Nowadays, 33.94 % of the Vietnam's population live in urban area (*General Statistics Office of Vietnam, 2016*) comprised of a few major cities (mega cities) and many towns. Today Vietnam has an urban network of 788 urban areas, including five major cities which belong to central government: Hanoi and Hai Phong in the North, Danang in the Centre part, Hochiminh city in the South and Cantho in the Mekong river delta. The urbanization process has been strongly speeded up with the influences of the reform policy and open door market oriented economy since 1986. The migrant flow between urban and rural areas from 1999 to 2009 showed a significant contribution of population movement to urban than to rural population. The rural – urban flows increased from 855.943 (account for 7.2%) in 1999 to 2.062.171 (account for 8.9%) in 2009 (*Ministry of Investment and Planning, 2011*)

In the period 2005-2015, the population of Vietnam increased at an average of 1.08%. The population of Vietnam by 2005 was 82.4 million but at the end of 2015, this number was 91.7 million (*General Statistics Office, 2016*). Currently, a total population of 94,952,080 inhabitants according to United Nations' report. The urban population is forecasted about 44 million nationwide in 2020; in 2025, about 52 million people, accounting for 50% of total population nationwide as of 2025.

In 2015, total number of urban areas nationwide reaches over 870 municipalities and will be 1,000 in 2025. In 2015, the demand for urban construction land is of about 335,000 ha, accounting for 1.06% of nationwide natural land, average rate 95m²/person; in 2025, they are 450,000ha, 1.4% and 85 m²/person, respectively.

The reform of policies related to land ownership and housing and the strong support of government for urban planning stimulated urban growth in the whole country. These changes initiated calls for greater de-centralization and transfer of economic and infrastructure development responsibilities to provincial land municipal governmental systems.

During the last 20 years of renovation, Vietnam has been successful in generating rapid economic growth. It was the key issue of population and development and caused threats to the environment. In order to get advantages of potential positive impacts and minimize the negative effects of urbanization and population development to the environment, it is necessary to integrate environmental planning and spatial planning into urban plans as well as in socio–economic plans to steer the development process.

This report is carried out in order to describe how urban, environmental and spatial planning is being implemented and how the policy-making process has been made. It should identify challenges and gaps between these plans and illustrate problems to be solved. In addition, this paper also proposes measures to strengthen the capacity of the urban and environmental planning system in Vietnam, particularly through education, in the context of Vietnam's needs and opportunities and the country's aims for sustainable development.

1.1. Urban development

In the last decade, the urban network has been developed and evenly distributed in six socio-economic regions of Vietnam. The urban areas developed very fast, both in quality and quantity, increased from 626 by 1999 to 788 by 2015 (Vietnam Urban Planning and Development Association, 2016).
In the period 1999-2009, national population increased by 15.11 million people, of which 13.05 million (accounting for 86%) living in urban areas. Urban population increased from 18.1 million (1999) to 22.3 million people (2005), 25.6 million people (2009) and 31.1 million people (2015) accounting for 33.9% of the nation's population. The average growth rate of urban population was 3.5% per year (*General Statistics Office of Vietnam, 2016*).

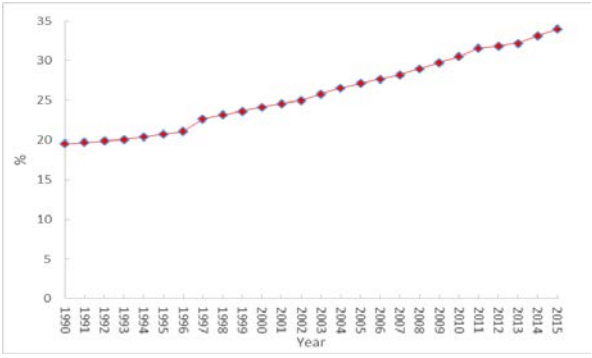

Figure 1. Proportion [%] of population living in urban areas, 1990–2015 *(General Statistics Office of Vietnam 2016)*

The national urbanization rate increased from 20.7% (1999) to 25% (2003), 26.97% (2005), 28% (2007), about 30% (2009), about 35% (2015) ***(****Vietnam Urban Planning and Development Association, 2016)*. Urban network was reasonably distributed into six regions of country. The number of urban centers/cities increased from 629 (1999) to 649 (2000), to 656 (2003), to 708 (2004), to 725 (2005), to 729 (2006), to 743 (2007), to 747 (2008) (*Ngo Trung Hai, 2010*), to 755 (2011) and to 788 (2015) (*Vietnam Urban Planning*

and Development Association, 2016). As can be seen from these figures, the total number of urban centers/cities has increased by 159 centers/cities (around 1/5 in total) in 16 years (1999-2015), it means the average increase was *nearly* ***one urban center/cities per month***.

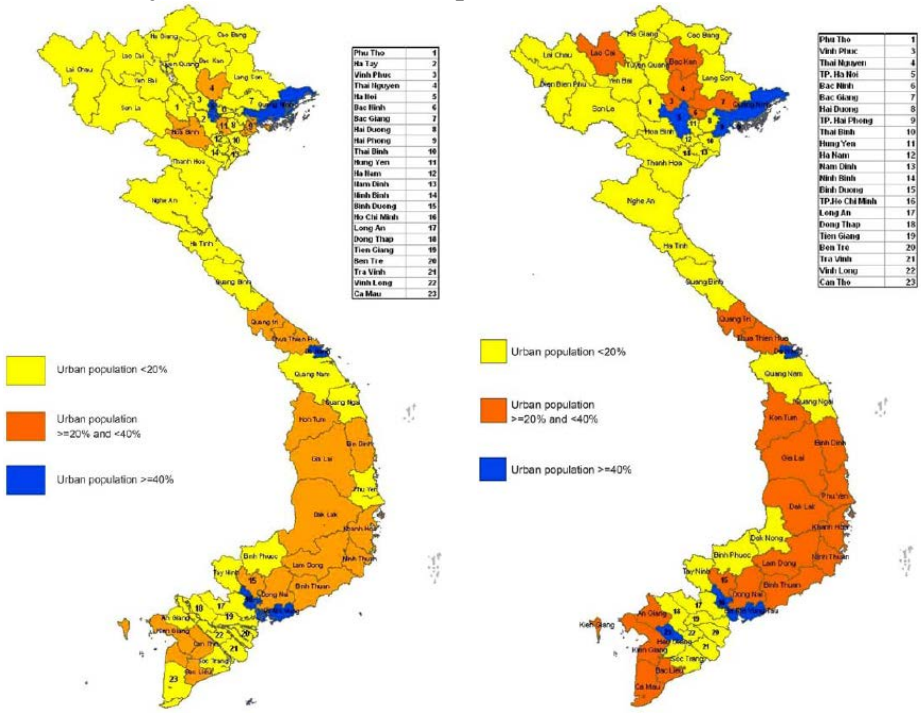

Figure 2. Proportion of population living in urban areas in 1999 and 2009 (*Ministry of Planning and Investment, 2011*)

Economic activities in urban areas contribute approximately 70% of GDP of Vietnam. The GDP growth rate increased continuously from 1990 to 2008 and reached 8.5% in 2007. The GDP growth rate decreased to 6.3% by 2008, 5.3% in 2009; increased slightly to 6.8% in 2010 due to the global economic degradation, and finally ends up reaching 6.68% in 2015 (*General Statistics Office of Vietnam, 2016*).

1.2. Land use change and demand

In 1995, the total land use for urban construction was 63,000 ha (80 m^2/person). It reached 325,195 ha and 390,914 ha in 2005 and 2007, respectively (*Ngo Trung Hai, 2010*).

It is estimated by the Ministry of Construction that by 2015 the urban population of Vietnam will reach 35 million people, the urbanization rate is 38% and the demand of land use for urban construction is 335,000 ha. By 2020, the urban population will reach 44 million people, the urbanization rate is 45% and the demand of land use for urban construction is 400,000 ha (in 1.7 million ha of total urban areas). By 2025, the urban population will reach 52 million people; the urbanization rate is 50% and will need 450,000 ha for urban construction. The development of urban areas, urban centers/cities and industrial zones will continue at faster rate and the consequence is that more land will be changed to non-agricultural land that makes agricultural land will continue to decrease and it will cause overuse of agricultural land for urbanization.

Table 1. Land use in Vietnam

No.	Items	Year 2014	
		Area (ha)	Proportion (%)
	Total	**33,096,731**	**100.00**
I	***Agriculture Land***	***26,822,953***	***81.04***
1	Land for agriculture	10,231,717	38.14

	Land for forest	15,845,333	59.07
3	Land for aquaculture	707,827	2.64
4	Land for salt	17,887	0.07
5	Other agriculture lands	20,190	0.08
II	***Non agriculture land***	***3,796,871***	***11.47***
1	Land for housing	702,303	18.50
2	Land for special purposes	1,904,575	50.16
3	Land for religious purposes	15,.296	0.40
4	Land for cemetery	101,966	2.69
5	Land for rivers, streams, reservoir	1,068,418	28.14
6	Other non-agriculture lands	4,313	0.11
III	***Land not in use***	***2,476,908***	***7.48***
1	Flat country	224,741	9.07
2	Mountain	1,987,445	80.24
3	Limestone mountain without forest	264,722	10.69

(Sources: Ministry of Natural Resources & Environment, 2014)

1.3. Infrastructure in urban areas

Beside the high rate of development as stated above, the urban development process still suffers from fragmented plans, insufficient and ineffective infrastructure provision. Prior to the new Land Law of 2013, around 80% of housing was owner constructed. Most of the houses were built on an informal basis outside planning and building regulations and without adequate supporting infrastructure.

Water Supply: In 2015, 81% of urban population had access to treated pipe water that meets national standards. The investment for new facilities was not adequate with the urbanization rate. The proportion of the population with access to supply water has increased only around 2.5% per year.

Wastewater treatment: While some wastewater treatment plants have been built and put into service in some big cities of Vietnam, many cities of Vietnam do not collect or treat municipal wastewater, but discharge directly to the receiving rivers.

According to Ministry of Construction, the total capacity of 24 existing centralised wastewater treatment plants is about 670,000 m^3/day *[NH Tien, 2013]*. As estimated, in Vietnam only 10% of urban wastewater is treated (World Bank, 2013). By 2015, nearly 90% of households have septic tanks, however only 4% effective operating. In the period of 2005-2015, about USD 250 million was annually invested for muncipal wastewater treatment plants. According to the Ministry of Construction, before November 2013 only eight urban areas in Vietnam (mainly in big cities including Hanoi, Ho Chi Minh City, Da Nang, Quang Ninh, Da Lat, Buon Ma Thuat, Bac Giang and Phan Rang) had centralised wastewater treatment plants. However, in recent years a large number of decentralised wastewater treatment plants have been constructed in both large and medium-sized urban areas such as Hanoi, Bac Ninh, Vinh and Can Tho under support from the Vietnam Government and a number of international organisations. By 2015, 20 municipal wastewater treatment plants in operation and more than 50 plants in planning and construction *[TTH Hoa and NV Anh, 2013]*.

Drainage system: Vietnam uses one drainage system for both storm water and wastewater. These sewerage systems are normally managed by province or city-owned companies (sometimes also referred to as "state-owned companies"). By 2015, 60% of households accessed to public sewage systems; 10% of collected

drainage was treated in centralized wastewater treatment plants *[TTH Hoa and NV Anh, 2013]*. In the last few years, the drainage system and wastewater treatment have been partially renewed and got some improvement in quality. The average water consumption is 100-150 l/person/day and the rate of water loss is of about 24.5%. The urban drainage system only covers 70-80% of wastewater demand. During raining season, all of Vietnam largest cities have to cope with flood. The reason for this is because of the degradation of old drainage system, small size sewer, little steep and large sediments. As the urban growth, the nature drainage systems are disrupted and have been replaced with concrete or brick drains and culverts. In addition, the old drainage systems have not kept pace with urban development and often not planned as part of an integrated urban network.

Solid waste management: In 2002, the municipal waste in big urban areas was 0.9-1.2 kg/person/day and in small urban areas was 0.5-0.65 kg/person/year. In 2008, these numbers reached 1.45 kg/person/day and 0.4 kg/person/day respectively. The studies showed that the waste generation rate of urban areas increase 10-16%/year. It is estimated that by 2020 the waste generation is of about 20 million tons/day. Municipal waste collection, transportation only meets 84-85% demand by 2013-2014 (*State of Environment Report 2015*). The reuse of municipal waste is 20-30%.

Table 2. Green area at urban space of Vietnam (m^2/person) compared to other cities

City	Standards	Target	Other Cities	Fact
Hà Nội	12 - 15	2,0	Washington (Mỹ)	40
Tp. Hồ Chí Minh	12 - 15	3,3	New York (Mỹ)	29,3
Huế	10 - 12	3,5	Berlin (Đức)	27,4
Đà Nẵng	10 - 12	0,9	London (Anh)	26,9
Hải Phòng	10 - 12	2,0	Matxcova (Nga)	26
Nam Định	10 - 12	1,5	Nam Kinh (Trung Quốc)	22
Hạ Long	10 - 12	3,1	Quế Lâm (Trung Quốc	11
Vĩnh Yên	9 - 11	3,2	Paris (Pháp)	10
Hải Dương	9 - 11	3,7	Hàng Châu (Trung Quốc)	7,3
Bắc Ninh	9 - 11	2,7		
Hưng Yên	9 - 11	3,2		

(Sources: Ministry of Natural Resources & Environment, 2011)

Green areas: Many provinces do not pay much attention to the parks and green spaces in urban areas. The green areas do not meet the environmental demands and urban landscape improvement: too small and not adequate in the capable of storing, filtering water, absorbing dust and CO_2 as well as improving urban microclimate.

Air and noise pollution:
The main sources of air pollution in urban areas come from transportation (account for 70%), construction, industry, resident and waste treatment *(Ministry of Transport, 2010*).

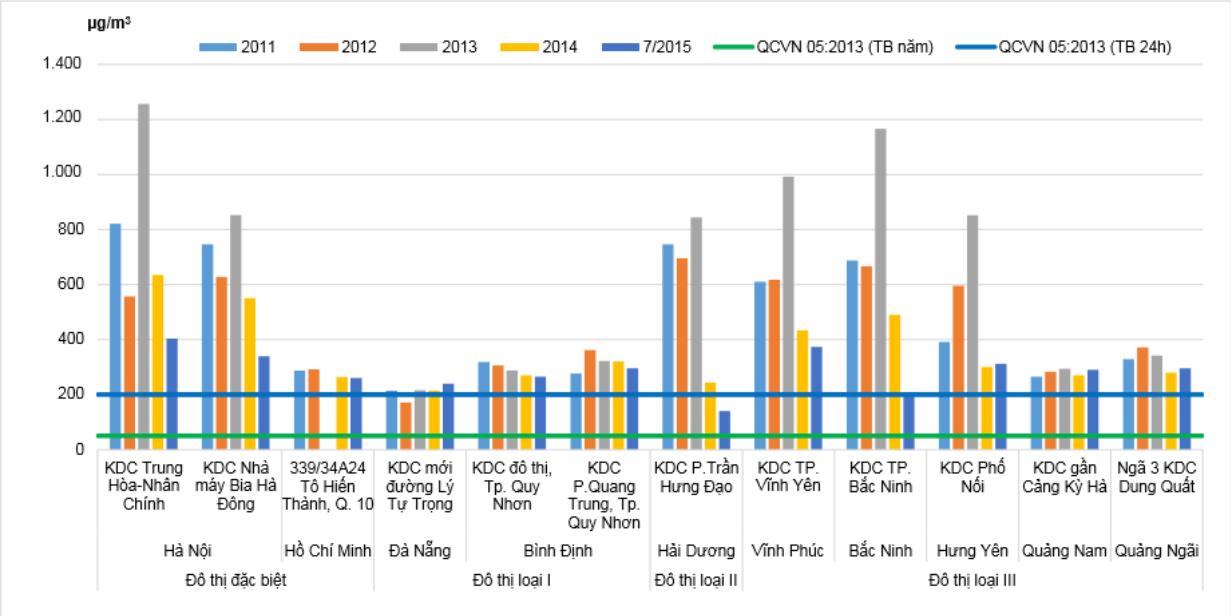

Figure 3. TSP concentration at some main urban road of Viet Nam (2011 – 2015)) (*Status of Environmental Report - stage 2011 – 2015 (2016)*)

Transportation activities contribute for 85% of CO and 95% of VOCs. Industrial activities are the main contributors of SO_2. Transportation and industrial activities deliver the same portion of NO_2. For TSP, cement and building material factories are the main sources and account for 70% (*Ministry of Natural Resources & Environment, 2010*)

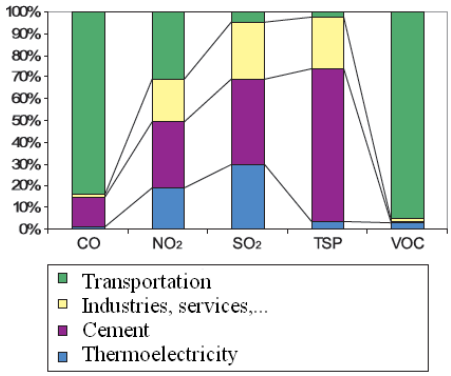

Figure 4. Contribution of pollutants by sources (*Ministry of Natural Resources & Environment, 2010*)

The noise level in urban areas tends to increase but is still under the limit, except for the roads in big cities. The monitoring showed that the noise levels at these roads were higher than the limit.

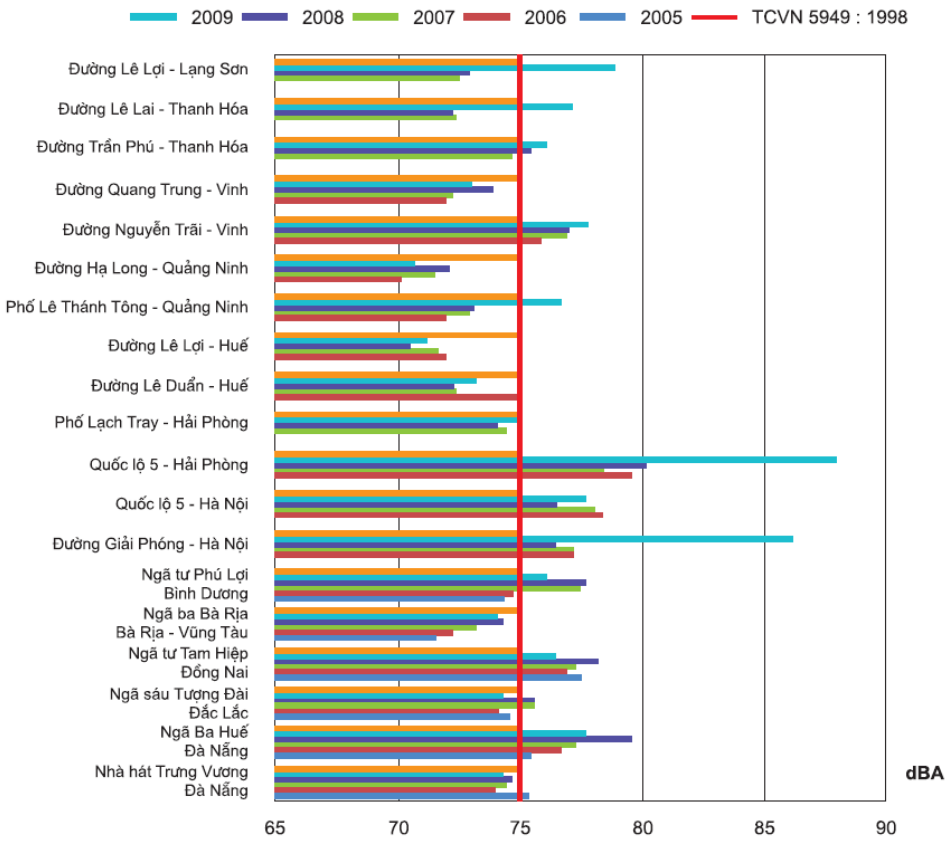

Figure 5. Noise pollution at some main roads in Northern and Central of Vietnam (2005-2009) (MoNRE, 2011)

Urban transportation system: Vietnam has the highest motorbike ownership per capita in the world. The transportation infrastructure develops rather fast with a total length of the road transport of 212.151 km (average of 0.63 km/km^2 and 2.34 km/1000 person) but is still not adequate and not updated in comparison with other countries in the regions: there is only 43% of roads in good condition, the bad and very bad road accounts for 57%. This road quality causes more fuel consumption, slower speed, and higher air pollution (*Ministry of Transport, 2009*).

Besides, the government has invested in improving the quality of transport system in urban areas to meet the demand of urban development. The BRT, tram, metro and urban rail transit systems are being built in the big cities and metropolitan like Hanoi and Ho Chi Minh cities. However, the proportion of land for urban transportation infrastructure only accounts for 13% of the urban land (required are around 20-25%), the proportion of statics transport is 1% (requirement is 3-3.5%). That is the reason why traffic congestions usually happen and contribute a major part of air pollution in big cities of Vietnam.

Figure 6. Transportation is one of the major contributions of air pollution in urban areas of Vietnam

Social development: Socio development issues are not fully recognised in the urban planning system. With the virtual collapse of residency provisions and the growth of jobs in the cities, rural to urban migration is contributing to a large undocumented urban population. Lack of clarity to date over land tenure and land use rights drive social and political concerns, fuelling new urban social movements, which actively oppose some urban redevelopment projects.

Development control: There is low compliance with development control laws, regulatory decrees and plans, not only because of the independent development of squatter settlements in urban areas but also of inconsistent application of policies between central and local government. In practice, there is a wide discretion in local urban development decision-making, too frequently associated with corrupt practices.

It was reported by 2002 that about 25% of the urban population was living in substandard, or temporary, houses. Housing conditions differ significantly between Northern and Southern Vietnam. The quality of housing also varies with income level. The incidence of slums is higher in the south (*World Bank 2009).*

State owned companies are now building significant numbers of houses, particularly high-rise apartment blocks but mainly focus to middle and upper income earners. However, meeting the demand of housing needs of poor people who are moving to urban areas is a major challenge for government.

Beside, Vietnamese government has set some targets in many policies such as the Comprehensive Poverty Reduction and Growth Strategy, the Vietnam Development Goals, and the various "Orientation Master Plans" for urban development, water supply, drainage and wastewater, and solid waste management, but none of the documents attempts to cost, or prioritise, the objectives. Estimates of the financing needs to meet the urban infrastructure coverage targets set by government for 2010 suggest that around $26 billion would have to be mobilized. That amount cannot be financed from the State budget and other sources of finance that need to be mobilized (*WB 2009*).

2. Urban Planning systems of Vietnam

2.1. Local government and urban system

Vietnam has a three-tiered system of local/regional/government. The first level in administrative terms is provinces (including provinces and governmental controlled cities), the second level is districts, and the third level is towns/communes.

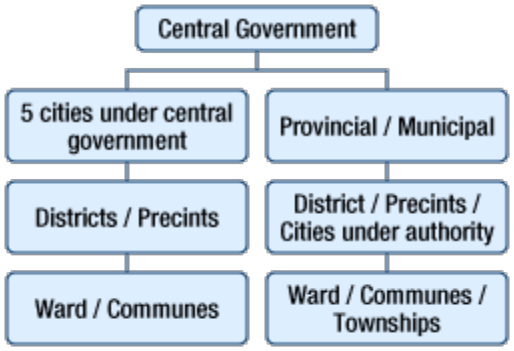

Figure 7. Administrative system of Vietnam

According to Decision of Prime Minister: 445/QD-TTg, dated 07.04.2009 about Vietnam Urban development Orientation and Strategy with Vision toward the year 2050, Vietnam will

- develop its urban system toward urban network model
- develop synchronic and modern technical and social infrastructure, create good urban living quality and environment, develop advanced urban architecture with national identity.

The orientation of general development and figures are the following:

- from 2009 to 2015: the key economic regions and large urban areas are put high priority on and the comprehensive economic zones play the role as a dominant growth pole at national level;
- from 2015 to 2025: the development of basic urbanized area is put priority on to reduce the local and dispersed development. In the period from 2026 to 2050 the urban network will be generally implemented.

The urban areas will be distributed to six national socio-economic regions:

1. Northern midland and mountainous region
2. Red river delta regions
3. North Central and Central coastal regions
4. Central highland region
5. Southeast region
6. Mekong river delta region

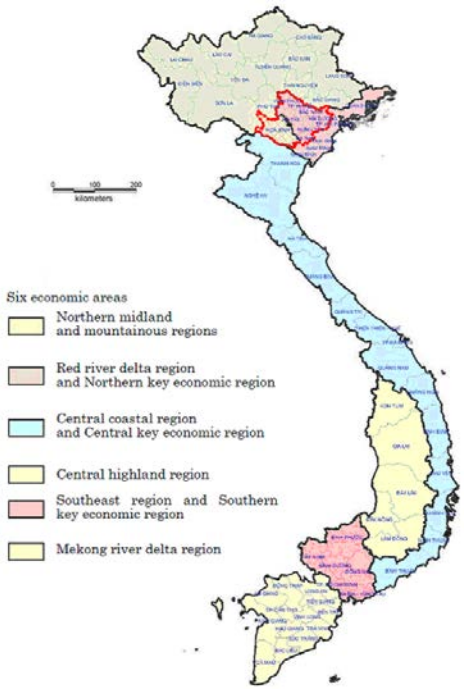

Figure 8. Socio-Economical regions of Vietnam

2.2. Urban planning system

Currently, there are three main types of plans related to the use of land in Vietnam:

- *Spatial plan*: including Construction plan and Land use plan
- *Socio-economic plan*: is the Vietnam Socio-economic Development Plan
- *Sector plans*: for functional sectors of ministries which include for instance environmental plans.

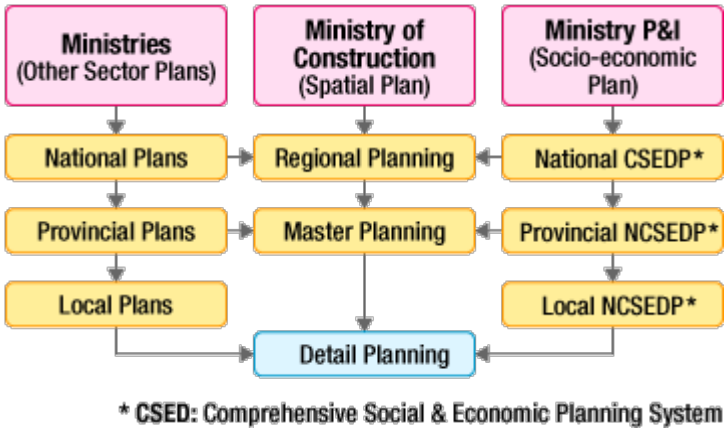

Figure 9. Planning systems of Vietnam

2.2.1. Spatial planning

Urban planning is an essential tool for the spatial arrangement of land uses in urban areas. Article 11 in chapter II of the Construction Law contains regulations for Construction master plans. It is a set of regulations for urban, regional and/or spatial plans. Based on this Construction Law, Vietnam has undertaken the creation of regional construction plans that divide the country into 6 socio-economic regions.

On June 17, 2009, Chapter II was separated from the Construction Law by a new law named the Urban Planning Law. This law was enacted on January 1, 2010 and applied to planning and urban development in urban areas. Regional planning and rural planning still comply with Construction Law.

Before the new Urban Planning Law (2009), the spatial plan was divided into:

- Master Plan Orientation for Vietnam's Urban System Development (National plan),
- Regional plans (Ministry of Construction/provinces): identify potential development, resources and forces driving the development of a region and its urban and settlement system.
- Master plans (cities/provinces): form the layout of spatial structure and guideline for urban development and living environment for 15-20 years in long term and 5-10 years in short term.
- Detailed plans (districts, wards, industry zones, or development projects): determine the land uses of specific urban space and provides the basic for all construction.

These plans lay out specific ways to use land in specific locations, especially depend on administrative boundary.

According to the Urban Planning Law (2009), the Ministry of Construction is responsible for urban planning. Urban planning is classified into the following types:

- General planning (which is made for centrally run cities, provincial cities, towns, townships and new urban centers/cities) is the organization of the space and system of technical and social infrastructure facilities and houses for an urban center suitable to its socio-economic development, ensuring defence, security and sustainable development.
- Zoning planning (which is made for areas within cities, towns and new urban centers/cities) is the division and determination of functions and norms on the use of planned urban land of land areas, networks of social and technical infrastructure facilities within an urban area in order to concretize a general plan.
- Detailed planning (which is made for areas to meet urban development and management requirements or construction investment needs) is the division and determination of norms on the use of planned urban land, requirements on management of architecture and landscape of each lot of land; arrangement of technical and social infrastructure facilities in order to concretize a zoning plan or general plan.

The Ministry of Construction is responsible for drawing up regional construction plans for the capital and other metropolitan areas. The Ministry of Construction proposes plans that involve multiple provinces (in this case Hanoi and other centrally controlled cities). The Ministry of Construction then seeks the opinions of related agencies and their branches, other relevant ministries, and the centrally controlled cities' people's committees, after which the plans are submitted to the Prime Minister for approval.

2.2.2. Socio-economical plan

The two components of the centrally planned Vietnam Socio-economic Development Plan are:

- 10 year Socio-economic Development Strategy, and
- 5 year Socio-economic Development Plans.

The stated objective of the current 10 year strategy is "to accelerate national industrialization and modernization along the socialist line and to build the foundation for the country to basically become an industrialized nation by 2020."
The Ministry of Planning and Investment (MPI) is responsible for the 10 year strategies and 5 year plans. The MPI is the primary government organ delegated with the responsibility of coordinating with the relevant agencies involved in the drafting of the plans and with producing the final documents. The proposal developed by the MPI is finalized after official deliberations by the government and within the Communist Party.

Under the Vietnam Socio-economic Development Plan scheme, a bottom-up mechanism is employed whereby local governments (communes, districts, and provinces) issue proposals to the higher levels of

government, which are then ultimately and eventually send to the MPI, where they are incorporated into the country's overall spatial development policies.

2.2.3. Environmental Planning and its links to spatial planning and socio-economic planning

Environmental planning is an example of sector planning. It is the process of facilitating decision making to carry out development with due consideration given to the natural environmental, social, political, economic and governance factors and provides a holistic frame work to achieve sustainable development. It has a close connection with socio-economic plan, spatial plan, natural resource management & integrated land use, infrastructure systems and governance frameworks.

In Vietnam, it is done through strategic environmental assessment (SEA) in the course of urban planning to protect the environment, prevent catastrophes affecting the community, improve landscape, and conserve cultural and historical relics and local traits. Until now, SEA has been done in about 40 among 63 provinces of Vietnam. Some provinces of Vietnam have carried out environmental planning but it almost based on socio-economical plan and nothing changes after the environmental planning.

The socio-economical plan mentions the threat of environmental pollution, climate change and rising sea level to sustainable development. It also presents basic directions and concrete targets regarding environmental protection and improvement, emphasising the requirement of environmental protection in each branch and locality's development strategy and scheme as well as in each project, promoting the society's involvement in environmental protection and environmental services' development.

Article 23 to Article 30 of Urban Planning Law define the contents of urban planning tasks and General plans of centrally run cities, provincial cities, townships, urban centers, zoning plan, detail plan relating to strategic environmental assessment. Section 6 (includes Article 39 and Article 40) define content of strategic environmental assessment:
"a/ Assessment of the present situation of the urban environment regarding hydro-meteorological conditions; quality of water, air and eco system, geology; soil erosion; solid wastes, wastewater and noise; exploitation and utilization of natural resources; climate change; social issues, landscape, culture and heritage sites, as a basis for putting forward urban planning solutions;
b/ Forecasts about environmental development in the course of realizing urban planning;
c/ Comprehensive solutions to preventing, reducing and remedying environmental impacts and making environmental monitoring plans."

These links between spatial plan, socio-economical plan, and environmental plan are a good base for environmental planning activities to be implemented.

2.2.4. Weakness of urban planning in Vietnam

The responsibilities for urban planning in Vietnam are fragmented between ministries and between the different levels of government. As mentioned above, each ministry is responsible for the plan of cities and provinces: Ministry of Planning and Investment is responsible for socio-economic development plan; Ministry of Construction is responsible for spatial plan; other ministries are responsible for their sector plans (including environmental plan). The intended sequence of planning with spatial plans following socio- economic plans and sector plans does not always occur.

The central Government planning institutes prepare many plans. They want to promulgate political ideals rather than responding to measured demand and market signals. There is very limited public participation, or even consultation, in the process.

The planning system is unnecessarily complex, bureaucratic, highly centralized. Laws and regulatory decrees, which guide the administrative procedures, are ambiguous, out dated and impractical. Collaboration between agencies involving plan preparation and implementation is poor. Project delays are common be-

cause of poorly coordinated budgets and few plans are fully implemented. Infrastructure and land development projects are poorly coordinated and the majority of small-scale projects, such as housing, are built without proper approval.

2.3. Cities of Vietnamese partners

2.3.1. Hanoi

Hanoi, the capital of Vietnam, is the cultural and political centre of the Vietnamese nation. Hanoi, with a total area of 3,344.6 km^2 (of which urban area is 186.22 km^2) and a population of 7.21 million, average population density of 2171 persons per km^2 (HSO, 2015) is one of the 2 biggest cities in Vietnam in term of population (following Ho Chi Minh city).

Wastewater:

This large number of people and high population density consequently produce a large volume of wastewater. It is estimated that Hanoi city discharges nearly 790,000 m^3/day of domestic wastewater, 37,000 m^3/day of wastewater coming from industry zones/parks located within Hanoi, exclude about more than 300,000 m^3/day of wastewater from industry establishments outside of industry zones/parks and services, 6,083.6 m^3/day of wastewater from hospitals, medical and private clinic centres (MONRE, 2009).

The effluents drain to the south of Hanoi to settling ponds in the Thanh Tri district before eventually discharging to the Red River. Drainage and sewerage form a combined system that flows by gravity into lakes, ponds and rivers. In the urban areas, storm water and wastewater is discharged into rivers, regulating lakes and ponds through combined sewers and channels. There are big lakes and ponds, which are interconnected with the Kim Nguu and Set rivers. These water bodies help regulate drainage and wastewater flow, provide water for agriculture use and enable ground water recharge.

Fecal Sludge management:

In Hanoi, the Cau Dzien waste treatment station (mostly for solid waste treatment, upgraded by Spanish project since 2003). 10 – 30m^3/day (mostly septage from public toilets serviced by Hanoi URENCO) is treated out of 500m^3/day generated. Septage collected by private emptiers is discharged illegally to drains or environment

For septage: two treatment options were designed: (1) co-composting with organic waste from market; and (2) anaerobic digestion/settling. Treatment option (1) does not work. Treatment (2) has limited efficiency. Settled sludge is dumped.

Municipal waste management:

Hanoi account for 54.3% of the total urban solid waste discharged by the whole northern region of Vietnam (Hanoi URENCO, 2006). The average waste collected rate is estimated as 86.6% of the whole region, where it is up to 98% in Hanoi . The population growth, urbanization and increasing of consumption are reasons of rapid waste generation, which also increase the portion of hazardous waste (batteries, household solvents etc.) and non-degradable waste (plastics, metal) in MSW. According to (JICA, 2006), MSW quantity in Hanoi would increase to 2,384 ton/d in 2010 and continue to be the top of the North in the incoming years.

Solid waste:

According to Hanoi DoNRE (2016), for the period of 2011 - 2015, the domestic solid waste counted for 60%, industrial 10%, construction 20 - 25%, and agriculture and rural 5 - 8% of total solid waste. The total solid waste of Hanoi is about 5,515 ton/day, of which domestic solid waste of 12 inner cities districts and Son Tay town is 3,388 ton/day; and 17 suburb districts is 2,127 ton/day. The collection ratios reach 98% and 89%, respectively. In the inner cities, solid waste is mainly collected by Urban Environmental Company (URENCO) then recycled, dumped, and incinerated in Nam Son (Soc Son), Xuan Sơn (Son Tay), Nui Thoong (Chuong My) landfills. However, many dumping landfills do not meet the requirements for sanitary landfill (counts 85-90% in landfill). That causes serious environmental issues such as landfill gases/odor and leachate. For example in Nam Son landfill, there are 3 leachate treatment modules with total capacity of 3,600 m^3/day and night. Whereas, 927,000 m^3 leachate has not been treated (in collected pond). As calculated, the amount of solid waste incinerated is about 698 ton/day (counts 30% of total solid waste). The target for 2025 is that 100% of solid waste will be collected and utilized for recycle using advanced technologies. Hanoi will implement comprehensive measures in Solid waste management planning to 2030, orientation to 2050 of Prime Minister. The technical priorities according time periods: 2016 - 2018: sanitary

landfill; R&D electrical incineration; 2018 - 2020: recycle and reproduction are mainly prioritized, incineration with energy recovery is partly, and insitu landfill, establish complete 3R model in Hanoi.

Water environment:

The Hanoi capital is located in the Red River Basin. Groundwater and surface water are the major water resources, of which the ground water is mainly used for domestic purposes using tube wells. Recently, it is found that groundwater in Hanoi is contaminated by iron and magne+A44sium and some other pollutants e.g. arsenic, ammonium. Some previous studies reported that the groundwater pollution in Hanoi was caused by the wastewater disposal of domestic and industrial activities without treatment. The annual rainfall of Hanoi is about 1,600mm and 85% of the rainfall occurs from May to October. The surface water sources are mainly from the rivers and the lakes. Hanoi is located within the floodplain of the Red River, which may cause the flood to likely occur in most rainy seasons such as July and August in upstream regions. The challenges for water drainage work in Hanoi are the combined sewer system in the inner city, especially in rain season. That also causes the waste water treatment to become much more costly. Waste water sources mainly consist of: domestic, hospital and industries. There are some centralized municipal wastewater treatment plants e.g. Kim Lien, Yen So, Truc Bach,...however they do not meet the requirement. For industrial wastewater, only few industrial zone/cluster have centralized wastewater treatment plant e.g. Thang Long, Noi Bai,...For the purpose of sustainable development in water management, the waste water must be separated and treated at source.

Air environment:

According to the director of the municipal Department of Natural Resources and Environment, the quality of air in the capital city - Hanoi is consistently getting worse, especially in urban areas, mainly due to transportation and construction. The majority are dust and some VOCs pollution in some places. One of the reasons is that the environmental monitoring and pollution control remained ineffective. Currently, only two of the six air monitoring stations in Hanoi are still operating and only two wastewater monitoring stations in Ta Thanh Oai Commune, Thanh Tri district and Phung Chau Commune, Chương My district. Hanoi city has actively carried out some measures to improve the environment such as planting one million trees, treating and improving the water quality of lake/ponds, and building more reservoirs. In addition, a roadmap will be set up to reduce the number of private vehicles in the inner city and to ban the use of coal for cooking. Another important solution is upgrading the environmental quality monitoring system, especially the collection, analysis of air and wastewater samples at monitoring stations and establishing a network with the Ministry of Natural Resources and Environment's system to manage and share the monitoring data.

2.3.2. Hai Phong

- Geographical location: Hai Phong, a coastal city, lies on in the Hong Delta and Northern Key Economic Region (NKER), and 102km away from Hanoi Capital. Hai Phong coordinates between $20^0$30'39"and $21^0$01'15" north latitude and $106^0$23'39" - $107^0$08'39" east longitude (It, in addition, avails Bach Long Vy Island District sits on Tonkin Gulf and coordinates between 20^0C 07' 35"and 20^0C 08' 36" north latitude, and $107^0$42'20"-$107^0$44'15" east longitude). It borders Quang Ninh Province in the north, Hai Duong Province in the west, Thai Binh Province in the south, and the East Sea in the east.

Natural area: 1,519.2km^2 (2008)

- Continental shelf: more than 100,000km^2
- Coastal line: over 125km
- Climate: Hai Phong has a tropical monsoon climate with two distinct seasons: winter and summer. Winter (northern wind season) with cold and dry weather lasts between November and April (following year). Summer (southern wind) with cool weather and much rain lasts between May and October. Average annual precipitation is 1,600 – 1,800mm; average monthly temperature: 20 – 23^{0}C; and average annual humidity: 80 – 85%.
- Topography: Hai Phong has a diversified terrain. Its northern area is midlands inserted by hills, while southern area has a low and rather even and fat terrain of the plain sloping towards sea.

- Administrative unit: Hai Phong comprises 7 districts of Hong Bang, Le Chan, Ngo Quyen, Kien An, Duong Kinh, Do Son, and rural districts of An Duong, An Lao, Kien Thuy, Thuy Tien, Tien Lang, Vinh Bao, Cat Ba, and Bach Long Vy.

INFRASTRUCTURES

Transport system: Hai Phong lies on the axis of important road, rail, and seaways nationwide and international. It has seaports, airports, and a synchronous network of roadway transport.

Roadway: Hai Phong's roadway transport is rather convenient to freight goods between Hai Phong and Ha Noi, northern provinces through National Roads 5 and 10. National Road 5, which is 102km long, 23,5m wide, has six lanes, and is the most modern one in Vietnam. National Road 5 joins National Road 1, thereby carrying goods from Hai Phong to border provinces of Lang Son, Cao Bang, and Lao Cai or to Ha Noi, then Ho Chi Minh City, and southern provinces. National 10 joins big coal mines, and then runs through well-known tourist places such as Ha Long in Quang Ninh Province, and coastal provinces from Thai Binh to Thanh Hoa.

It is possible that Hai Phong shall be in contention for the socio-economic development thanks to National Roads 1 &5 upgradation and Ha Noi-Hai Phong Motor-way Project-to-be.

Waterway: Hai Phong Port, the biggest one in the northern region, is a big import-export center at home. 40% of cargo volumes in the northern region are carried through Hai Phong's waterway network. Hai Phong Port plus Cai Lan Seaport at capacity of tens of million tons forms a large sized port cluster, going a long way towards carrying cargoes from northern region to other regions nationwide and doing in-transit cargo service for southwestern China.

Railway: Hai Phong-Ha Noi-Lao Cai Rail Route connecting with Kunming (China) and Hai Phong-Ha Noi-Lang Son-Nam Ninh Rail Route is convenient to carry goods to southern China swiftly. Hai Phong-Ha Noi Rail Route contributes importantly to the railway network leading to Ho Chi Minh City.

Airway: Cat Bi Airport, a major one of Hai Phong City, is 5km away from the center of the city, and can accommodate Airbus 320 and airplanes with the same tonnage of Airbus 320. It plans flights to Ho Chi Minh City, and flights to Hong Kong, Ma Cau. In the future, it shall be upgraded to receive bigger airplanes.

Telecommunications: By the agency of advanced telecommunication network, Hai Phong supplies users with domestic and overseas telecommunications services such as phone services, card phone, fax, mobile, prepayment service, e-mail, and internet service.

Power supply: Hai Phong uses electricity from the national grid. The electricity for Hai Phong is mainly from hydroelectric plants of Hoa Binh, Pha Lai, and Uong Bi. At present, Hai Phong is investing in a thermo-electric plant at capacity of 1,200 MW to provide electricity for the city compass and the national grid.

Water supply: Hai Phong avails five water works of An Duong, Cau Nguyet, Vat Cach, Do Son, Minh Duc at capacity of 176,000m3/ day. Thanks to profuse water from rivers of Da Do, Re, and Gia, water plants are under construction to satisfy demands for the city's development, particularly industrial parks and new townships.

Education and training: The quality of education and training at all levels are increasingly elevated. The total current number of schools are 479, of which 218 of which are primary schools, 204 are junior ones, and 57 are senior ones.

The total classes from high schools are 8,253, teachers are 16,204, and students are 293,380. Hai Phong has 4 universities, 2 colleges, 53 vocational training units, and 2 research institutes. Force of laborers in Hai Phong is more skillful than that of laborers in other provinces of NKER. 17,500 laborers are annually trained, increasing the rate of trained laborers by over 25%. It is the advantage that lures investors.

Health care: Hai Phong has carried national health programs and medical examination and treatment. It has 259 health centers, 22 of which are hospitals and 1 sanatorium and rehabilitation, 16 regional health clinics, 220 ward health stations. Total patient beds amount to 5,430.

The number of medical staff is 1,359 doctors, 780 physicians, 1,919 nurses, 547 midwives, 125 high-ranking pharmacists, middle-ranking pharmacists, and 300 druggists.

2.3.3. Hue

Located in the central part of Vietnam, Hue is developed in the flat land of the downstream basin of the Huong River. The city is best known as the capital of the Nguyen Dynasty which lasted from the beginning of the 19th century to the middle of the 20th century. The Complex of Hue Monuments was recognized as a World Cultural Heritage by UNESCO in 1993. An urban development plan designed to turn Hue into a metropolis is being implemented, raising expectations of further population growth in the future.

- The city's water supply currently meets the demands of all water users in terms of both quantity and quality, and is well planned for the city's future development. The provincial water supply company (HUEWACO) has shown their good practices, good service and high operation efficiency. Huong River has

proved to be a sustainable water source for water supply for the city in particular and the province as a whole. However, some problems in its water quality may occur when some upstream dams and reservoirs get into operation.

- The present drainage and sewerage system don't have enough performance capacity: low coverage rate, old construction, over loading, etc. The inadequacy and insufficient capacity of drainage network has led to annual floods as well as inundations. To make matters worse, the mostly untreated wastewater from residential areas, hotels, markets and other services is now discharged directly into rivers and lakes within the city. As a result, the water quality of Huong River which flows through the center of the urban area, is getting worse.

- The solid waste management has some advantages, namely high collection rate, high capacity of landfill and recycling facilities, etc. However, fundamental data for management and prediction are poor, public awareness is still limited, and the leachate is not appropriately controlled.

- Practically, the collection of sludge (from sewer) and septage is done so well, but little attention is paid to their treatment. At present, the septage from septic tanks and sludge from sewer system is landfilled without any pre-treatment.

- Household sanitation is generally good in practice with high percentage of population being able to access to hygienic facilities. However, there is a weak linkage between household and public sanitation systems (for example, people build their own toilet and on-site treatment system without information or well understanding about public sewer system around their house). Care of sanitation facilities (e.g. toilet, septic tank) is not often taken into account.

- The socialization in sanitation sectors is still limited in Hue city. Only a small number of private organizations have joined in septage collection.

- The improvement of sanitation conditions has always been a leading focus of Hue city's authority. The development of this system seems to be much dependent on external resources such as loans, technology and human resources.

2.3.4. Da Nang

Geographical location:

Danang is located in middle of central Vietnam, between Hanoi and Ho Chi Minh City. It is embraced by the east sea with 150km of seacoast. Its mainland latitude and longitude is 15º55' to 16º14' N and 107º18' to 108º20' E.

Climate:

Da Nang is located in the zone of typical tropical monsoon, temperate and equable climate. The city's weather bears the combination of the north and the south climate characters with the inclination to the former. There are two seasons: the wet season from August to December and the dry season from January to July, cold waves are occasional but they are of average and short lasting. Average humidity is 83.4%. Average temperature is about 26^0C, the highest is 28-30^0C in June, July and August; the lowest is 18-23^0C in December, January and February. In Ba Na Mountain, the temperature is 20^0C. Average rainfall is 2,505mm per year that concentrates during October and November.
The average humidity is 83.4%; highest in October and November the average of 85.67 to 87.67%; lowest in June and July, the average of 76.67 to 77.33%.
The average annual rainfall is 2504.57 mm / year; highest rainfall on October and November the average of 550 - 1,000 mm / month; lowest in months January, February , the average from 23-40 mm/month. Average hours of sunshine is 2156.2 hours; most on May and June, the average of 234 to 277 hours / month; least on November and December , the average from 69 to 165 hours / month.

Terrain:

Terrain of Da Nang has just plain and mountain, high mountains and steep concentrated in the North West and West, from here there are many mountains run long to the sea, some low hills interspersed alternative narrow coastal plains.

Mountainous terrain occupied large area, height from 700-1.500m, large slope (>400), where high concentration of watershed forests and has meaningful to protection of ecological environment of the city. Short and steep Rivers System, originating from the west, northwest and Quang Nam province. Coastal plain is the low land influenced by salinity marine, is the focus of many basis of agriculture, industry, services, military, land and in the functional areas of the city.

Administrative unit: Danang comprises 6 districts of Hai Chau, Thanh Khe, Lien Chieu, Ngu Hanh Son, Son Tra, Cam Le and 2 rural districts of Hoa Vang and Hoang Sa.

Danang has a network of road, rail, sea and air routes:

To date, Da Nang port is ranked as the national first grade seaport. Modern handling equipment and warehouses serve the operation of the port with a capacity up to 6 million tons per year. The Tien Sa terminal is a natural deep water seaport with the deepest of 12 meters, the total berth length is 965 meters including two finger piers and a container berth. The Tien Sa terminal can accommodate general cargo ships of 40,000 DWT, container ships of 2,000 TEUS and passenger ships of 75,000 GRT.

Danang International Airport is one of the three largest and most modern airports of Vietnam. The three - storey passenger terminal with 36.6000m2 using area has met the criteria of the International Air Transport Association , and can receive 4 million to 6 million passengers per year.

Da Nang Railway Station is located in the inner city, being considered as one of the largest and the best stations in the Central Region and also among the most important ones of the North-South railway line. At Da Nang station, passengers can buy tickets to any stations across the country.

Water supply system and electricity supply and production is gradually being upgraded. They are built to serve the people life better as well as for production and business activities. Information and communication has been developed, modernized and became the third largest center in the country.

There are currently 18 polyclinic and specialized hospitals, 11 district-level hospitals and medical centers, 47 ward-level medical aid stations and more than 900 private clinics.

Being the largest education center of the Central and Highland region and the third largest one nationwide (following Hanoi and Ho Chi Minh city), Danang city now has 15 universities and institutions, 17 colleges together with a number of vocational schools and centres and more than 200 schools of all levels from kindergarten to high school.

Da Nang is facing with

- Urbanization and Pollution: Environmental pollution of air, water, soil, solid wastes
- Saline intrusion, Unsustainable water supply
- Typhoons, Heavy rain, flood, landslide, drought, ….
- Food safety
- Health issue
- Energy demand and energy use efficiency
- Low income Housing
- Noise pollution

2.3.5. Ho Chi Minh city

NATURAL CONDITIONS:

Ho Chi Minh City (HCMC) is located within the geographic coordinates at North of Latitude 10 ^{0} 10’ – 10 ^{0} 38' and East of Longitude 106 ^{0} 22’ – 106 ^{0}54'.

Ho Chi Minh City has a dense network of rivers with a canal system stretches more than 2,900 hectares and very favorable for irrigation and shipping. Its climate has an average of temperature about 21 - 29oC, with the difference in temperature between the seasons no more than 5oC; and the average rainfall is about 2,000 mm with average humidity of about 75-80%. There are two seasons in Ho Chi Minh City; the rainy season between May and November and the sunny season between December and April of the following year with two main wind direction from South and North-North-East and seemed in the past years have no hurricanes or floods.

Ho Chi Minh City has about 0.6% of the land area and 6.6% of the population compared to the country. It is located in the southern key economic zone, is the economic center of the country, and has a high economic growth rate. Ho Chi Minh City has taken the lead in the country about economic growth.

INFRASTRUCTURE:

Transport system: Ho Chi Minh City is the main city with role of an important transport hub in Vietnam and Southeast Asia. Differ from marine transport in Hanoi, Ho Chi Minh City located in a position as a significant proportion. For merchandise transport, sea freight stored about 29% and River about 20% of the volume through the clues of the city. Only 44% of road freight transport in the commodity but accounts for 85.6% of the passenger transport.
Roadway: Road traffic, HCMC city has six Intercity coach Ben was distributed in the gateway in and out: Eastern, Western, Cho Lon Market, Tan Binh - Tay Ninh. Network capable of receiving over 1,200 vehicles/day.
Waterway: HCM has four sea ports such as: Sài Gòn, Bến Nghé, Nhà Bè, Tân Cảng and river ports such as Bình Đông, Tân Thuận, Tôn Thất Thuyết, Bình Lợi, Bình Phước, etc. The Sài Gòn port is one of the largest sea ports of Vietnam which transfers almost 25% of total shifted products of country.
Railway: Railway traffic of the inner city, including routes and surrounding areas - by Railway Union Enterprise Management 3, the North - South and a few dedicated, now almost stopped exploitation. Besides, there are some small railway stations such as Di An, Thu Duc, Binh Trieu, Go Vap.
Airway: Tan Son Nhat International Airport (TIA) / Road landing (Runway): with 2 runway to 3048m and 3800m length/ airports Tan Son Nhat International Airport is the most busy and has no output highest shipping nationwide / today at the international airport of Tan Son Nhat not have 04 domestic airlines (Vietnam Airlines, Vietjet Air, Jetstar Pacific and VASCO) are exploiting the domestic and international routes and 43 firms international aviation activities, including passenger carriers and freight carriers.
Health care: The health care system of the city is relatively developed with a chain of about 100 government owned hospitals or medical centres and dozens of privately owned clinics. The 1,400 bed in Chợ Rẫy Hospital, upgraded by Japanese aid and the French-sponsored Institute of Cardiology, are among the top medical facilities in Indochina.

3. Urban planning profession and education

Vietnamese professionals in the urban sector have a long history of city building and are influenced by China, French, Japan and US. In Northern Vietnam, urban plans were first influenced by French style, and then by Eastern European, especially by Soviet-style planning with static master plans and central economic planning system. In Southern Vietnam, the urbanization process was associated with the US period, but with little development of urban planning practice and there was no urban planning profession. For that reason, the reform policy in 1999 marked a major step forward in linking economic and environmental planning with urban planning. However, without enough well trained urban planners this promise will not be realized.

Currently, there is a strong demand for skilled professionals in all areas of urban development. Government agencies recognize architecture, engineering and other professional qualifications but not much on urban planning and nothing on environmental planning. Urban education has been carried out in a limited number of education institutions.

Table 3: List of training facilities with related fields

No.	Training Facilities	Name of the training program	Education level	Training objective	Graduation title	Website
1	VNU University of Science (VNU-HUS)	Environmental Sciences; Water and Soil Environment; Land administration	Bachelor, Master, PhD	Provides education and training in the urban sector environmental sciences	Environmental Sciences; Water and Soil Environment; Land administration	www.hus.vnu.edu.vn
2	National University of Civil Engineering (NUCE)	-Water and wastewater engineering; -Environmental Engineering; -Urban and Regional Planning; -Urban infrastructure engineering; -Urban infrastructure management.	Bachelor; MSc; PhD	Training students on: Water and wastewater engineering; Environmental Engineering; Urban planning; Urban infrastructure engineering; In-door engineering systems; Urban infrastructure management… Focus on the training of engineers with knowledge about Urban Planning, Urban Design, Regional Planning, Engineering systems in urban areas… to provide students good knowledge and technical skills in design, construction, management of different types of urban development projects, operation and exploitation of urban systems and buildings.	Water engineer; Environmental Engineers; Architect; Urban planner; Urban infrastructure engineer; M&E engineer.	www.nuce.edu.vn
3	Hue University of Sciences (HUS)	Environmental Science, Architecture	Bachelor Master	Provide training on: Environmental Management; Environmental Engineering; Environmental Ecology and Climate change; Basic Architecture; Architecture and Engineering; Conservation, Landscape and Planning	Environmental Science, Architecture	http://www.husc.edu.vn/

No.	Training Facilities	Name of the training program	Education level	Training objective	Graduation title	Website
4	The University of Da Nang, University of Science and Technology (DUT)	Environmental Engineering, Natural Resources and Environmental Management, Civil engineering	Bachelor Master	Provides education and training in Environmental engineering, Natural Resources and Environmental Management, Civil engineering, Urban architecture and Rural development & planning	Environmental Engineering;, Natural Resources and Environmental Management; Civil and Industrial Construction Engineering; Architecture	http://www.dut.udn.vn/
5	Hochiminh University of Natural Resources and Environment (HCMUNRE)	Environment Engineering, Natural Resources and Environmental management, Water supply and drainage, Land management; Renewable energy and Climate change	Bachelor, Master on environmental engineering (will start in the end of 2017)	Provide and train students on: Knowledge on: waste management, water and energy supply, urban environment management, environmental management and planning, GIS, public media communication. - Skill: analyzing, evaluating and proposing planning solutions to implement for urban management and other related sectors. - Attitude: aware of the importance of urban management and the role/or duty of citizens on urban environmental management.	Environmental Engineering, Environmental management, Natural Resources and Environmental management, Technology, Water supply and drainage, land management, renewable energy and climate changes	http://www.hcmunre.edu.vn
6	Hanoi Architectural University	Urban and Rural Planning	Bachelor	Focus on the training of architects with knowledge about urban space, building design, urban architecture and rural development & planning.	Planning Architect, Landscape Architect	http://hau.edu.vn/
7	Ho Chi Minh City	Urban and Regional	Bachelor	- Knowledge: Students are equipped with basic and expert	Architect of Urban	http://uah.edu.vn

No.	Training Facilities	Name of the training program	Education level	Training objective	Graduation title	Website
	University of Architecture	Planning		knowledge on urban planning and related fields. - Skill: analyzing, evaluating and proposing planning solutions to implement urban planning project in reality. - Attitude: aware of the importance of urban planning in the development of a region, city and country.	and Regional Planning.	
8	Ho Chi Minh City University of Social Sciences and Humanities	Urban and Regional Planning	Bachelor	Graduate students from the bachelor of science program of urban and regional planning are capable of consulting, coordinating, policy designing; functional urban management; construction, evaluation and project assessment; teaching and research in universities, research institutes and other tasks related to the field of urban development.	Bachelor of Science in Urban and Regional Planning	http://hcmussh.edu.vn
9	Ton Duc Thang University	Urban and Regional Planning	Bachelor	Training engineers capable of planning and consulting projects related to Regional Planning, Zoning Planning and detailed planning of Urban Construction… Managing investment projects on construction of Urban Planning. State management of construction planning, environmental management and urban infrastructure systems.	Planning Engineer	http://tdt.edu.vn/
10	University of Transport and Communications	Transport Planning and Management	Bachelor	Provides training on urban transportation	Transport Planning and Management	http://www.utc.edu.vn/

No.	Training Facilities	Name of the training program	Education level	Training objective	Graduation title	Website
11	Vietnam German University	Sustainable Urban Development	Master	Spatial data modelling as well as real estate appraisal models, empirical methods and traffic analysis are some of those instruments the students are introduced to	Sustainable Urban Development	http://www.vgu.edu.vn/

Besides, there is also a need for a fundamental education and training in GIS for all spatially related study programmes especially supporting tools for spatial planning, environmental management, utility administration, and land registration.

4. Proposed direction toward smart sustainable Vietnamese cities

4.1. Zoning plan and the change of the planning methodology

With the new Urban Planning Law in 2009, which became effective in 2010, the new urban planning method has been introduced, which is Zoning Planning. It overcomes the limitation of Euclidian zoning, which have been used many in the past.

For many Vietnamese people, the term Zoning Planning is quite new because in the past they only learned and knew about other spatial planning methods, likes Euclidian zoning, which depend very much on administrative boundaries. Zoning Planning and Land use planning mean the science, art and organizing order of land, human resources, facilities and services for better socio-economy, health and urban.
Beside flexibility and rationality, other factors like geography, landscape and water, heritage, etc. also need to be considered in urban planning process. It is necessary to have an active link between residential areas and working place and public service to avoid traffic congestion, make a logical urban structure, especially in regeneration plan or re-urbanization of the old urban areas. A dynamic urban setting should be a good combination of zoning plan methods that include:

- Performance zoning: so called effects-based planning or planning to make results, provides flexibility, reasonable, clear and duty to avoid arbitrary of Euclidian zoning, combine with environmental protection and adapt to market rules and private property. This method need to be used very carefully under the control of the government.
- Incentive zoning: provides a system that encourages the development to meet targets of urban development. It provides a basic understanding on the range and limit of encouragement to attract investors' attention in combination with the intended developing criteria. Incentive zoning allows high flexibility but is more complicated in management.
- Form-based zoning: provides more flexibility compared to Euclidian zoning. Form-based zoning does not classify land use by types but by form depend on using purpose. For example, the form-based zoning in high population density area is better in traffic with many ways for pedestrian.

Nowadays, the inputs of zoning planning should be a combination of Equality, Economy and Environment. It is necessary to change the planning methodology.

An urban area with zoning plan can be divided into 5 zones:
1. Relocation Promotion Zone: city center
2. Restricted Development Zone: urban area surrounding city center
3. Encouraged Development Zone: satellite urban areas

4. Environmental Protection Zone: for forest, agriculture, heritage,.ect. It also is preserved for the future.
5. Special Development Zone: for national security and defence.

4.2. Approach for spatial planning

In the globalization process and assimilated into world economy, following market oriented economy toward socialist, it is necessary for Vietnam to change its planning approach in order to achieve sustainable development with 2 output targets: competitiveness and liveability and 2 input targets: good governance and bankability.

That work can be done by using Integrated Strategic Planning and Participatory Approach, which were introduced in the nineties. It was a recommended in National Project VIE/95/051 on Improving Capacity on Urban Management and Planning in Ho Chi Minh city from 1996-1998 which was approved by Ho Chi Minh People Committee but until now has not been put into practice yet.

However, Integrated Strategic Planning cannot replace socio-economic plans and urban construction plans as well as environmental plans. We can say Integrated Strategic Planning and Participatory Approach is an umbrella that covers all kind of mentioned plans. It is necessary to have an organization to manage and integrate all of these plans.

Integrated Strategic Planning is the cooperation between government, communities and business following Participatory Approach. It is capable of utilizing all resources and cooperate all development activities at a large scale, is a management tool of the government, change the conception from “plan for urban” to “urban makes plan”. Integrated Strategic Planning will find and highlight the common region/common interest of the plans that meet the targets of sustainable development.

Base on SWOT analysis, strengths, weakness of internal environment and opportunities, threats of external environment will be compared to targets of sustainable development to find out development strategies, these are outputs of integrated Strategic Plan.

There will be many projects and spatial demands after having development strategy; they are inputs for urban construction plan. Nowadays, urban development in the context of market oriented economy and globalization is the result of market, in which there are many projects and decisions of medium and small investors, thereby plan is a support following the development of projects.

Plan that is actually is forecasting and forecasting can never become 100% of realistic even it was made by the most talented planners. It needs to be adjusted regularly by the development of the project, even with functional zoning plan and detailed plan.

Integrated Strategic Planning overcomes disadvantages of traditional plan by its comprehensive, flexibility, practice instead of theory, not focus on result but on process, and with community participation, it need to be soon implemented in Vietnam.

4.3. Education, Training and Professional Development

As stated above, due to professional institutions for environmental and urban planners are not well developed, it needs the cooperation of independent professional organizations in environment and urban planning education and training (e.g. Vietnam Urban Expert Networks, National Institute of Urban and Rural Planning, Planning Association of Vietnam, etc.).

Furthermore, training programs have generally not covered both the range of skills needed and the depth of knowledge. In-service training requires stronger linkages between the workplaces and educational institutions for recognition of workplace learning, including among non-governmental agencies, consultants and international firms active in Vietnam.

In addition, environmental and urban planners are considered as architects, engineers, or in some cases, economists. There is no professional registration or certification of urban planners. This is linked to the relative absence of education programs in environmental and urban planning. Thus strengthening the capacity of institutions on urban plan is critical to improve urban development in Vietnam. Methods of development, conservation, economic, environmental protection and social development are also essential parts. Besides, there is an urgent need to increase the number and quality of urban planning professionals for the urban sector to assist Vietnam's partners promoting urban planning policy reform in a more smart sustainable direction.

Vietnamese universities is seeking to contribute to these tasks by trying to integrating new modules, opening new double degree programs on Urban and Environmental Planning, building up research program in environmental and urban planning, infrastructure and management with potential partners.

5. Self-assessment at the Vietnamese university partners

5.1. Self-assessment of VNU University of Science

5.1.1. Strengths

- Being the oldest university in Vietnam, previously the Indochina University, the VNU University of Science always maintains and develops the achievements and core values of a leading education institution in Vietnam.
- The vision and mission of the University match and satisfy the stakeholders' needs,, the core values fit within the University's vision and missions, the development strategies of the University are in accordance with the vision, missions, and core values. The University has high quality professional staffs with reputation and passion for their professions and has the continuation of different generations.
- The University has a logical organization system with clear responsibility division.
- The University always guarantees the availability and transparency of financial expenditures and spending, the University has raised the funding resources for institutional activities through the establishment and implementation of numerous high quality educational programs (Talented, Honors, Advanced, and International Standard).
- The University has appropriate encouragement and rewarding policies to timely recognize and encourage collective and individual achievements and always support the staffs in seeking training to improve professional skills.
- The University is the pioneering university in successfully executing and implementing the training programs of talented, honors, advanced and international standards.
- The University has the strength in basic research, indicated by the number of international publications.
- The University has established numerous collaborations with advanced educational institutes worldwide and many reputable collaborators in the nation.
- The University always highly respects the quality assurance process and constantly improving the quality, is the leading institution in the universities in the Vietnam National University, Hanoi regarding the education quality assurance, especially in accordance to international standards.

Strengths of the Faculty of Environmental Sciences (FES)

The Program of Environmental Sciences (ES) has been applied since 1995. The program has been adjusted, updated for many times in order to satisfy requirements of the society as well as stakeholders, reflects the rapid development of environmental science. In 2012, the program had been updated according to the CDIO method with reference to the international programs, especially curriculums of Indiana University, United States. In 2015, the program continuously has a small update to supply the need of the society. The program indicates the following strengths:

1. Objectives and expected learning outcomes of the program are determined on the basis of knowledge, skills and values, to which both students and society aim, reflect mission, vision and development strategies of FES. Objectives of the program and expected learning outcomes are clearly published in order that stakeholders can monitor and contribute comments.
2. The program has diverse and updated reference sources, appropriate structures, showing the balance between basic knowledge, skills and specialized knowledge, skills. Moreover, the program allows the inter-education between undergraduate education and postgraduate education.
3. FES is the first unit in the whole country training in the field of environmental science, attracting many good students. The admission scores, rate of enrolled students are high and dropout rate of students is negligible.
4. FES has exchange cooperation programs with leading universities worldwide. This is the good opportunity for lecturers and students of the Faculty to learn from advanced teaching and learning experiences.
5. As one of the leading units in education of environmental science in Vietnam, FES has competitive advantages in the receipt of investment from the Government. The Faculty has rational physical facilities and studying conditions. Especially, funds for upgrading teaching and learning conditions of the Faculty have been increased in the recent years.
6. With the philosophy "learning by doing", the program has paid special attention to the practices and natural practise. This is the good opportunity for students to observe the issues of natural, social environment, collect valuable practical experiences. In the natural practices, students have received the instructions of experienced staff with deeply specialized knowledge.
7. The student inspection and assessment are performed very strict in order to ensure the objectivity and fairness. Moreover, different assessment and inspection methods are used to allow assessment of different skills of students, motivate students, help teaching staff assess the large classes, avoid the fraud in examination, etc. Assessment and inspection procedures are clearly notified to students at the beginning of semester. Therefore, students can concentrate on the study. In addition, these procedures also help students develop the critical skills, ability of self-assessment, mutual assessment and thinking of studying processes.
8. The quality of teaching staff has the decisive role for quality of curriculums. Academic staff of FES has full necessary qualities. Rate of associate professors and doctorates of FES is relatively high (54% and 89% of the lectures in the Faculty). Many lecturers are educated in the developed countries. They can teach in English. Moreover, the personal requirements are clearly determined and the development, training of staff are always prioritized and put into annual plan of the Faculty.
9. Students have the good studying environment with reasonable facilities. Students always receive the advice and support from the head teacher, academic consultants or Center for Student Support of VNU.

5.1.2. Weaknesses

- The KPIs system in strategic management has not yet completed, causing difficulties for the full assessment of strategic targets execution.
- Lack of detailed plans for risk management in education, scientific research, and community service.
- Limitation in the infrastructure for sport and leisure activities for staffs and students. The University has not been able to provide necessary infrastructure to support students with disabilities.
- The information technology division is not well integrated, the University does not have highly specialized management and educational software.
- Several educational programs do not have enough students registered. The University has not established interdisciplinary training programs at the undergraduate level.
- The number of international students and scientists coming for long term stay is limited.
- The number of patents, utilities solutions is limited, the level of knowledge and technology transfer needs improvement.
- Lack of full assessment method for evaluating the satisfaction of related parties and societal engagement and community service.
- The connecting activities with alumni are not strong and efficient.

Weaknesses of the Faculty of Environmental Sciences

Beside the advantages, the program of FES also shows some following weaknesses:

1. It takes more time to have regular consideration, adjustment, updating of curriculum passed and officially applied.
2. Although the program has received the strong support from the Government, the granted funds are still limited. Moreover, scientific research needs large funds. When the finance is limited to students, they have to choose the less costly programs (such as business administration, social sciences, education) will be more prioritized than the programs, which require costly practices, more funding (such as sciences, technology), therefore, it is hard to attract quality students who are not wealthy finance.
3. Scientific research themes are still based on the basic theory, lack of the link with practical needs. Researches are still discrete and commercialisation, exploitation of research and development is still weak.
4. Although FES has hired many young doctors, however, they need time to be experienced and to get used to the new environment of FES and the VNU-HUS. On the other hand, experienced teachers are at the age of retirement. Therefore, it affects to the quality of the teaching of FES.
5. Lecturers must spend relatively much time for teaching work. Therefore, some lecturers has no time for research.
6. Foreign language skills of the staff as well as students need to be more improved.

5.1.3. Improvement Plan

- Complete the KPIs system to reach an agreement in the assessment of strategic target execution.
- Establish and publish detailed plans in risk management in education, research, and community services.
- Actively coordinate the implementation of new campus in Hoa Lac to modernize and integrate the infrastructure, in which the convenience for students with disabilities and for sport/leisure activities is guaranteed.
- Continue to improve the information technology infrastructure to support the management and professional activities.
- Apply suitable solutions simultaneously to improve the quality of prospective students in all levels. Concentrate on prospective undergraduates from the High school for gifted students. Establish several interdisciplinary training programs based on the strengths of the University in basic scientific fields and prioritized fields for development.
- Promote international collaboration in education; increase international partnership for staff and student exchange with the University's strategic partners.
- Focus on investment for the development of strong research groups, increase exploitation and searches for more funding resources for research, increase partnership with businesses to raise the level of knowledge and technology transfer.
- Build complete surveys to evaluate the satisfaction of related parties in the results of the societal engagement and community service activities.
- Increase connection with Alumni to improve the support and collaboration from former students.

Improvement Plan of the Faculty of Environmental Sciences

1. FES shall additionally organize the new student meetings from the beginning of studying year 2015-2016 in order to provide students with necessary information, advice in order that students can quickly adapt to new studying environment and succeed in studying.
2. From the next studying year, FES will establish the bilateral cooperation relations with companies, potential sponsors, and industrial partners in order to seek financing for research, promote the inter-sector application research to shorten the distances between the theory and practice and come to commercialization of research results.
3. FES will pay more attention to alumni student track studies as well as investigations for employers. These investigation results will form bases to assess the level of conformity of the program and education methodology, help more understanding of social needs and education demands in the next years.
4. FES will enhance personal development and make specific program, plan. The Faculty will consider and assess the strengths, weaknesses of each module, current state of human resources, research program etc. in order to develop the strategic plan of Faculty as well as specific action plan for each module.
5. For the young lectures, FES will find an appropriate position for them and get experienced lecture to help them to be more confident with their ability.

6. FES also has a plan for lectures and students to improve their English by short and long domestic courses as well as send them abroad to train.

5.1.4. Curriculum Design and Review

The VNU University of Science has a system to design, develop, monitor, review and approve curricula for all study programs and courses with inputs and feedbacks from stakeholders to ensure that the curricula are proper and updated. This system consists of leaders of the faculties, and Departments, the OUAA, the OPAA, the OILQA, the Faculty Science and Training Council, the Faculty Review and Evaluation Committee, the University Science and Training Council, the University Review and Evaluation Committee, and the Rectorate. Besides, new developed curricula require the approval by the VNU-Hanoi Review and Evaluation Committee. This system is implemented based on the education regulations of the MOET, the VNU-Hanoi and other guiding documents of the University. It is implemented by the following steps:

- Step 1: Establish an Expert Group to build and/or update the curricula. The group consists of representatives of lecturers, managing staffs; experts of fields/specialized fields; and employment organizations (academic, industrial and governmental organizations) that will employ students after graduation
- Step 2: The Expert Group drafts curricula, and collects opinions of stakeholders consisting of managers, scientists, experts, employment organizations, lecturers, students and alumni by questionnaires. In drafting and updating processes, the University curricula are compared with those of other universities in the world, especially curricula of our partners in the US (University of Illinois at Urbana-Champaign, with Chemistry curriculum, University of Washington-Seattle with Mathematics curriculum, Indiana University-Bloomington with Environmental science curriculum, Brown University with Physics curriculum, University of Wisconsin at Madison with Nuclear technology curriculum); and with other universities and colleges such as The Imperial college London, United Kingdom; Ghent University, Belgium; Oslo University (Swede); Queensland University, Australia; The National University of Singapore (NUS), Singapore; The Asia Institute of Technology – AIT – Bangkok, Thailand.
- Step 3: The Expert Group completes curricula and send them to the Faculty Science and Training Council for review. It then improves the curricula based on the findings and conclusions of the Faculty Science and Training Council described in their meeting memos. Besides, new developed curricula requires the approval by the University Science and Training Council.
- Step 4: The revised curricula are evaluated by the Faculty Review Committee, appointed by the University, and consisting of experts who have deep understanding about education areas of the University as well as in other facilities, managers and representatives of the employment organizations.
- Step 5: The curricula revised by the Faculty Review Committee are sent to VNU-Hanoi for consideration and approval. If a new field of study is proposed or the modification of a particular curriculum is more than 20% of the original one, VNU-Hanoi will establish a VNU's Committee to review and approve the proposed addition or modification

5.2. Self-assessment of National University of Civil Engineering

5.2.1. Strengths

Over 50 years of establishment and development (1966 – 2016), with 60 years of training (1956 – 2016), the National University of Civil Engineering in Hanoi (NUCE or HUCE) has become a leading center in educating, conducting scientific research, transferring technology and generating human resources of high quality for the country in the field of civil engineering, urban ad industrial development.

With a large number of highly-qualified staff and lecturers of various majors who have good professional knowledge, politics attitudes, dedication to the education cause, the University has provided more than 60,000 engineers and architects; over 4500 Masters, 170 doctors of various fields in civil engineering. Having graduated from the University of Civil Engineering, team of engineers, architects are working in different areas throughout the country, from construction sites, factories and enterprises, the state management agencies at central and local levels, contributing to the national course of development and defense. In addition to education and training, the National University of Civil Engineering also functions as place for conducting research, transferring technological science, creating numerous important contributions to development practice of the country.

The mission, vision and core values of the school are clearly defined:

• Missions: The missions of the National University of Civil Engineering are to train and generate the high-qualified human resources, carry out scientific research and transfer advanced technology in the field of civil engineering, to meet the demand of national industrialization, modernization and international integration.
• Vision: The National University of Civil Engineering strives to become the leading university in the field of civil engineering to reach the regional and international standard.
• Core values: Quality – Efficiency – Development – Integration.
- The University has clear mission, and development strategy and in-line with the context of Vietnam, as well as regional and international;
- The university strong branding and position in the community and society;
- The university structure is well organized ;
- Strong network with the local and central government, the state management agencies, organizations and domestic/international businesses;
- Strong alumni, closely connected with the school;
- Clear and consistent communication policies and strategy, specialized department for communication activities.
- Implement policies to boost research and development activities. The University has very strong network for doing research and transfer technology with research institutions, companies.
- Researchers and lecturers are qualified and uniform. The work force is very active working in science and technology activities.
- Closely connected with many domestic and international research institutions, education institutes, socio and economic organizations.
- The large number of undergraduate students, and graduate students. The students are qualified through strict enrolment, education process assessment. Number of students have good research skills through scientific works with professors and teachers.
- The high proportion of students to find job after graduation.
- Good network with international organizations. The university is member of number of prestige international organizations.
- Active cooperation with foreign companies in the field of civil engineering, environmental engineering, etc.
- The University is really entering the international integration process. From 2012, there are 5 undergraduate programs taught in English including Water and Wastewater Engineering. Graduates get very positive feedback from recruiting firms. Since 2015 the University is starting to switch to CDIO (Conceive – Design – Implement – Operate) which is internationally recognized advanced and sustainable education model. The University is currently working on both national evaluation criteria of Ministry of Education and Training (MOET) and international qualification and classification system (HCERES - the High Council for Evaluation of Research and Higher Education (HCERES).

5.2.2. Weaknesses
- Legal documents, procedures for specific administrative department have not yet updated.
- Central database for the university administration has not been completed.

Lack of the long-term information and communication (IC) strategy and mismatch in financial mobilization for IC.
- IC activities of the different departments are inconsistency and, sometimes overlapping each other.
- Number of technology transfer projects is still limited, and not event distributed among departments, schools.
- Limited number of experimental, practical, laboratory hours in the teaching curriculum.
- Some experimental equipment is out of dated, not standardized and qualifying the requirements of education program innovation.
- Limitation in developing short-term courses in cooperation with industries.
- Limitation in number of exchange students and staffs to abroad institutions.
- Few foreign students and researchers to work at university, at some departments and schools (like water and wastewater engineering, architecture and urban planning).

- Lack of policies, plans to encourage international students, lecturers and researchers to work at university.

5.2.3. Improvement Plan

Based on the annual evaluation results, the medium and long-term development plan is adjusted. In order to implement the objectives of the "Report on the current status and development planning of the National university of civil engineering for the period 2016-2020, with Vision to 2030", the university has reviewed and confirm the main objective for the period 2017-2019 as follows:

- In 2017:

+ Adjusted the administrative model and administrative system, standardize administrative activities of the university; develop the administrative systems towards modernization, powerful with application of IT;
+ Implement the university assessment, accreditation as planned by MOET and implement International assesement by HCERES;
+ Continue to upgrade infrastructure, teaching and learning facilities, especially laboratories, a modern library and uniform, in order to improve the quality of education and create conditions for developing Science and technology capacity;
+ Complete construction of H3 building, continue to invest the new campus in Phu Ly City, Ha Nam;
+ Complete basically the curriculum according to CDIO new approach.

- In 2018 and 2019:

+ Develop proposals and implement university autonomy.

5.2.4. Curriculum Design and Review

- Curriculum design process: Department scientific committee, University committee, Responsible lectures are involved. Besides, industries are invited to take part in curriculum design and review processes. At a whole process, program design and curriculum design is done based on the market demand. The teaching materials are being updated annually, while the curriculums are being review every 3 or 5 years.
- Curriculum review: Besides review by experienced lectures and university staff, students, the university carry out the assessment questionnaire to employers and stakeholders about the implemented curriculum.
- The evaluation criteria include: 1/ Curriculum with clear objectives; 2/ Contents of training programs to meet the requirements of the knowledge and skills of engineers; 3/ Curriculum include effective load of general knowledge; 4/ The training program contain sufficient of specialized knowledge; 5/ training program contain sufficient major knowledge; 6/ The subjects of the curriculum in coherence with each other; 7/ rational proportion between theory and practice; 8/ The training program includes courses provide basic skills and occupational skills.

5.3. Self-assessment of Hai Phong University

5.3.1. Strengths

- Haiphong University located in Haiphong sea port city. That is a university with historical background of foundation, development and achievements in teaching and doing scientific research. Haiphong University was original established in 1959. Since then, HU has celebrated 55 years of construction and development.
- In April 2000, Haiphong Teacher's Training University has established by integrating four large education and training units of Haiphong, which are Haiphong Pedagogical College, Foreign Language Center, Haiphong College for Continuing Education, and the Haiphong School of Staff Training for Educational Management and Teacher Fostering. In April 2004, Haiphong Teacher's Training University became Haiphong University with the aim of training the multi-disciplinary labor force to meet the requirement of industrialization and modernization of the city and the country.
- During the process of construction and development, HU has continuously improved the training quality and expanded the training scope to meet the mission of each economic-social development stage of Haiphong as well as cities in the Northern Coastal Area and all over the country.

- HU has four campus with a total area of 32 hectors. The main campus is located in Kien An district with an area of 27 hectors. There are enough spacious, modern dormitories for over 5,000 students
- The toal number of administrative staff, teaching staff and employees of the University are more than 900.
- In order to meet the requirements of industrialization and modernization of the country and international economic integration, HU has expanded its training scope to nearly 100 different majors from college level to university level and post-graduate level including the key sectors of pedagogy, economics and engineering.
- Scientific research affairs not only contribute to the improvement of training quality but also build human workforce for the University and to develop scientific capacity, serve the economic-social development of the local and the country. Every year, the University performed from 1-2 state-level scientific research projects, 3-5 ministerial level and city level scientific research projects, 60-70 scientific research missions in scientific research of the University and hundreds of topics of interest of the student that are really valuable in theory and practice
- HU has played a central function for cooperation and joint ventures associated with other higher education institutions, research institutes and production facilities to carry out the tasks of scientific research, held conferences at a national level and regional level.

5.3.2. Weaknesses

- The infrastructure, laboratories, technology center, machine and equipment are not adequate for the need of lecturers and students, especially in technical fields.
- The level of knowledge and technology transfer needs improvement.
- The connection between the University and alumni is not strong enough.
- Though having a large number of supporting staff and lecturers, there is still a lack of high quality human resources at some faculties/ departments while human resources at some other units are abundant.
- The University doesn't have specialized faculty for environmental major, but the content of environment is scattered in other faculties such as economics, tourism, construction, etc.

5.3.3. Improvement Plan

- The University continues investing in training its human resources and attracting high-qualified human resources.
- Promote exchange in international cooperation and international academic exchanges.
- The University is focusing on making any progress to establish new majors and is considering to establish the major in Environment in the future.
- Increase connection with Alumni to improve the support and collaboration from former students.

5.3.4. Curriculum Design and Review

Basically in designing any curriculum, we have a group of expert in that area to work with Department of Training in conducting teaching curriculum, reviewing.

5.4. Self-assessment of Hue University of Science

Hue University of Sciences was founded in 1957. It is one of the important regional universities of Vietnam. It is located in Hue the former imperial capital of Vietnam. Since it was founded the university has been well-recognized as having a tradition of fondness for learning, culture and education. Hue University of Sciences is a multidisciplinary and multi-field training institution with postgraduate and undergraduate degree programs, scientific research and technology transformation programs in terms of natural sciences, social sciences and humanities, and technology science. Hue University of Sciences provides the society with human resources, high-qualified science-technology products for the sake of serving the industrialization, modernalization in the country in general and in the Central Region and West Plateau in particular.

5.2.1. Strengths

- Hue University of Sciences (HUS) is one of the oldest university located in a traditional city Central of Vietnam.
- HUS has high quality faculties and staffs that meet to the training, researching in multidiscipline.

- Training programs was logic and clarity designed, usually updated to approach the demand of social rapidly developing on every fields in Vietnam.
- HUS has a tightly regulation and monitoring system in training program conducted by “Training office” and “Educational testing and quality assurance office”.
- Hue University of Sciences has established the tight relationship with institutes, universities, and colleges in the nation regarding the undergraduate and graduate education in the fields of information technology, biotechnology, environment, architecture, social work, sociology, journalism, etc.
- International co-operation to promote the growth of the University is one of the priority issues. HUSC has had over 50 Memorandum of Understanding (MOUs) with universities and institutes from Australia, Belarus, France, Finland, Italy, Japan, Germany, Korea, Laos, Territory Taiwan, Thailand, Poland and the USA.

5.4.2. Weaknesses

- Being a multidiscipline university, lack of the budget to invest for all of disciplines,
- Social demand and expected with trained product are over the current status of university ability due to the lack of modern facilities, laboratories and high quality faculties.
- Difficult in receiving the responses from alumni and demand of social on quality of training program.

5.4.3. Improvement Plan

As the strategic development plan of Hue University of Sciences, we strive to build the university become a high quality university, approaching the international standards; will be a strong university in sciences research and technology transfer in fields of Natural Science and Social science.

To really the strategic, we determined the missions:

1- To improve the organisation structure:
   Making a policy in management decentralisation for the faculty level.
   Focusing to attractive the high quality professors to teaching in the university
2- In training
   Updating the training curriculum and materials approaching the higher education advance program.
   Applying the technology and changing the teaching methods following the trends of improving the skills for students such as researching, group working, English,etc.
   Building the system to well receiving the responses from labor market.
3- Finalizing the system of Educational testing and quality assurance.
4- Organising the strong groups in the university to conduct the applying research.

Assure the budget for long-term activities of the university, concentrating to invest for the laboratories facilities approaching the developing of science and technology.

5.4.4. Curriculum Design and Review

- In Hue University of Science, we are applying the system in curriculum design and review that make by Ministry of Education and Training.
- Step 1: Establish an Faculties Committee to build (for new discipline) and/or update the curricula. The Committee including the representatives Department’s head, experience lecturers, experts of fields/specialized fields;
- Step 2: The Faculties Committee will drafts curricula, and collects opinions of stakeholders consisting of managers, scientists, experts, employment organizations, lecturers, students and alumni by questionnaires.
- Step 3: The Faculties Committee completes curricula and send them to the University Science and Training Council for review.
- Step 4: The revised curricula is evaluated by the Department’ Science and Training Committee.
- Step 5: The curricula revised by the Department’ Science and Training Committee will sent to Rector of Hue University of Science for issue.

5.5. Self-assessment of Da Nang University of Science and Technology

5.5.1. Strengths

- DUT is one of three polytechnic universities in Vietnam and the largest university in the middle part of Vietnam
- DUT was accredited education quality standard issued by The Minister of Education anf Training according to decision No. 62/QD-KDCL dated 14 October 2016 by Center for Education Accreditation - Vietnam National University, Hanoi.
- The vision and mission of DUT has been promulgated and is adjusted and supplemented to meet and satisfy the stakeholder's demands.
- DUT has built the network of officers for the educational quality assurance for all units. The implementation of educational quality assurance activities that are disseminated to all organizations, officials and students in the whole university.
- DUT assesses the quality of training programs every five years to improve, build, and develop the training programs.
- DUT has diversified training programs: full time program, inter-college program and 2nd degree program to meet the needs of lifelong learning, job change, part-time study.
- DUT always encourages and supports in teaching innovation followed the principle of "learner-centered approach". Lecturers of DUT have the clear and understandable teaching methods which highly appreciated by students.
- Lecturers conduct various assessment methods (homework, course project, midterm, final exam, oral presentation, product demonstration, written report, lab experiment and report, internship and capstone project, etc.) with clear and informed criteria, marking scheme or rubric to assess students' performance and align these to the course learning outcomes. Students are informed about assessment methods in the syllabus and at the first lecture of each course.
- Regularly surveying the employed rate of graduates, the income of new graduates, graduates within 1 year; has conducted a number of activities in order to assess the training quality of graduates; the training programs are regularly updated to meet the demands of stakeholders, the social changes and to catch up with the development of sciences and technologies in the field.
- The university is expanding cooperations with several universities in the world and takes advantage of the project finance to support the development and research capacity building and train managers and lecturers; many lecturers are studied and enhanced their professional qualifications at the universities, institutes of developed countries.
- University issues in various forms and full documentations on the training programs, learning outcomes, syllabus, assessment methods, training plans, training regulations of DUT and the MOET.
- The establishment of the Centre for Student Support and Corporate Relations helps DUT in exchanging and working with the recruited enterprises. The employed rate of graduates which are appropriate to their professional after graduation a month is more than 50%.
- DUT has a systematic procedure to collect and analyze student's feedbacks about the course teaching, program and training activities via online Management Feedback System. Based on the surveyed results, DUT adjusts teaching and training activities and improves training programs for the next revision and improvement.
- The University has set up a system of specified and detailed documents in order to effectively implement scientific and technological activities, building of scientific and technological development plan in line with a Research Orientation University.
- DUT has many positive measures to encourage its staff conduct scientific research projects; the regulations on supporting the officials who publish research papers on internaltional journal in foreign languages; the regulations on capability and morality standards in scientific and technological activities, and propagating the regulations on intellectual property, copyright for lecturers and students.
- DUT has the potential and capable scientific research team in implementing scientific research projects with university partners. Through these exchanges, scientific research cooperation with foreign partners, the scientific reputation and the number of international published papers of the university steadily increase every year.

Strengths of the Faculty of Environment (FE)

In 1993, Environmental Division was established from an environmental specialization group in Faculty of Civil and Industrial Engineering. The first course of Environmental Engineering major has been trained

since 2001 and the Natural Resources and Environmental Management major since 2009. The programs indicate the following strengths:

1. Graduates have solid fundamentals, generally meet the needs of society, can work without additional training.

2. The educational objectives and the program expected learning outcomes were developed to comply with the mission and vision of DUT, and to satisfy the needs of stakeholders and current practice.

3. The course learning outcomes are formulated on the revised Bloom's taxonomy and aligned well with the program learning outcomes.

4. Most lecturers graduated from oversea universities in the developed countries ensuring high quality in teaching, scientific research and training requirements.

5. FE has the enrolment policy in conformity with the legal regulations to attract students, the monitoring system in learning and practicing progress, study results, knowledge of students.

6. FE maintains the closed relationships with stakeholders; the programs are regularly updated to meet the demands of stakeholders, the social changes and to catch up with the development of sciences and technologies in the field.

7. The program offers opportunities for students to transfer to the partner universities for undergraduate and post-graduate degree.

5.5.2. Weaknesses

- DUT has not fully updated the resolutions and strategies of socio-economic development of the Provinces in Central area and Highlands in order to adjust training policies and strategies properly.

- Human and financial resources for educational quality assurance are still limited.

- The number of employers and alumni participating in developing the training programs, instructing projects, teaching subjects for some majors has been low. Updating, adjusting and supplementing training programs based on the feedbacks from alumni and employers in some faculties are still slow. Some training programs of the university have not been benchmarked with the curriculum of advanced universities in the world.

- The university has not paid attention on assessing the problem discovering and solving skills of students, analyzing the testing and evaluating results of each subject and the relevance of testing and evaluating methods for each subject and major.

- The relationships between DUT and businesses, enterprises are not strong enough for improving the training programs to perfectly meet the society needs and facilitate students find jobs being appropriate expertise; soft skills training and English proficiency of students are still limited.

- The international cooperation activities and the efficiency of implementing the Memorandum of Understandings (MOUs) signed has been uneven between Faculties of the university; some MOUs signed was slowly implemented; some faculties and departments are in confusion in implementing the processes and regulations of DUT on international cooperation.

- Parts of the dormitory are seriously being degraded; Current dormitory can only meet about 20% of the residential needs of students.

- The human power, facility, equipment potentials of the university was not utilized efficiently, especially in scientific research and technology transfer, strengthening scientific research capability to meet the society requirements.

- The cooperative training programs between DUT and universities, domestic and foreign educational institutions are still limited to contribute to DUT's budget.

Weaknesses of the Faculty of Environment (FE)

1. Soft skills and foreign language of the graduates are still limited.
2. The curriculum is not reviewed for all subjects, as well as no adjusted often.
3. The teaching methods need to improve to meet the program expected learning outcomes.
4. Curriculum is not announced in detail on website, the course outlines are also not announced in detail for Students.
5. The training program has not regularly collected the feedbacks of experts outside the university, employers and alumni for improving.
6. Working time at the laboratory, as well as approaching to and using the advanced equipments of the students have not been regularly.
7. Some equipments equipped for teaching was too old but has not yet been replaced.
8. The curriculum needs to be changed to satisfy more the needs of stakeholders and current practice.
9. Funding for scientific researches is limited, the implementation and development of scientific research are limited due to lack of funding.

5.5.3. Improvement Plan

-Training policies and strategies are adjusted properly based on the updated resolutions and strategies of socio-economic development of the Provinces in Central area and Highlands.

- Strengthening the human and financial resources for educational quality assurance.

- Strengthening the participation of employers and alumni in developing the training programs, instructing projects, teaching subjects for some majors. Updating, adjusting and supplementing training programs based on the feedbacks from alumni and employers in some faculties should be done regularly. The curricula structure and content should benchmark with the curriculum of advanced universities in the world.

- The university should pay attention on assessing the problem discovering and solving skills of students; the testing and evaluating results of each subject and the relevance of testing and evaluating methods need to analyze for each subject and major.

- Strengthening the relationships between DUT and businesses, enterprises for improving the training programs to perfectly meet the society needs and facilitate students find jobs being appropriate expertise; soft skills training and English proficiency of students should be trained more.

- Strengthening the international cooperation activities and the efficiency of implementing the Memorandum of Understandings (MOUs) signed; Instructing faculties and departments in implementing the processes and regulations of DUT on international cooperation.

- Upgrade and rebuild the dormitory.

- Try to exploit and utilize efficiently the human power, facility, equipment potentials of the university in scientific research and technology transfer, strengthening scientific research capability to meet the society requirements.

- Strengthening the cooperative training programs between DUT and universities, domestic and foreign educational institutions to contribute to DUT’s budget.

Improvement Plan of the Faculty of Environment (FE)

1. Soft skills and foreign language of the graduates should be trained more.
2. The curriculum should be reviewed for all subjects, as well as adjusted often.
3. Improving the teaching methods to meet the program expected learning outcomes.
4. Announcing the curriculum and the course outlines in detail on website for Students.

5. Collecting regularly the feedbacks of experts outside the university, employers and alumni for improving the training programs.
6. Strengthening the working time at the laboratory for students, as well as approaching to and using the advanced equipments of the students more regularly.
7. Upgrade or replace some old equipments. Equip new instruments.
8. The curriculum is regularly updated to satisfy the expectations of the stakeholders and current practice.
9. Try to diversify the funding sources for scientific researches.

5.5.4. Curriculum Design and Review

DUT was issued the instruction for designing the training program under credit system No. 1205/DHBK-DT dated 30 November 2011 by the Rector. In addition, DUT was also issued the process for new speciality, new major establishment or designing new course (Form 1-14P-010) according to the decision No. 63/QD-DHBK dated 22 October 2007 by the Rector. These documents ensure that the curricula are proper and updated. The process for new speciality, new major establishment or designing new course (Form 1-14P-010) according to the decision No. 63/QD-DHBK is as follows:

Step 1: Considering the society needs and the training capacity

Based on considering the social needs of new speciality, new major establishment or designing new course, Department of Academic Affairs of The University of Danang (UD), Board of Rectors, Department of Academic Affairs of DUT suggest the Departments, Faculties considerate the training capacities (man-power, facilities, equipments, ...) for new speciality, new major establishment or designing new course,

Step 2: Proposing new speciality, new major establishment or designing new course:

After reviewing the requirements and possibilities of training, the departments, the faculties will propose Board of Rectors, Department of Academic Affairs of DUT, Department of Academic Affairs of UD establish new speciality, new major or design new course. The proposal is followed the form 1-14P-010/F01.

Step 3: Checking and proposing new speciality, new major establishment or designing new course:

Based on the proposal of Departments, Faculties, the University Council will meet and review. If the University Council found that the proposal of the Department, Faculty matching the needs of society and the capacity of the university as well as the Faculty, the University Council of DUT will approve and recommend the Rector asks Departments, Faculties proceed to establish new speciality, new major project or design new course (Form 1-14P-010/F02). If it is not, the rector will request Departments, Faculties to collect more information.

Step 4: Send major establishment profile to UD

Following the approval of the rector on new major establishment, departments, faculties in coordination with Department of Academic Affairs of DUT produce the new major establishment profile. The profile send to the Department of Academic Affairs of UD consists of:

The statement of major establishment: major name, major code, major establishment reasons, training needs, number of students, degree, budget for training and entranced candidate (Form 1-14P-010/F03).

New major establishment or designing new course project (From 1-14P-010/F02)

Based on the new speciality, new major establishment profiles, the University Council of UD will assess and review the profiles. DUT's representatives will present to the University Council of UD the research results, scientific evidences ... on the necessary needs of new major establishment and the regulations for training implementation.

Step 5: Decision-making and enrolment notification

Followed the approval of the University Council of UD, the Director will issue a decision to allow a new major establishment.

In case of the training major is not yet specified in the training program list regulated by the Ministry of Education and Training, the university should present the scientific foundation of new training major. If the training major is approved by the University Council of UD, the Department of Academic Affairs of UD is responsible to complete the procedures for reporting to MOET.

5.6. Self-assessment of Ho Chi Minh University of Natural Resources and Environment

Established in 19 August 2011 based on its 35 year-old predecessor college , HCMUNRE is a public university under Ministry of Natural Resources and Environment. The head quarter campus, located at 236 B Le Van Sy St., Ward 1, Tan Binh Dist., HCMC is about 5,400 m^2 and the branch campus, located at Tam Phuoc Ward, Bien Hoa City, Dong Nai Province is about 54,888 m^2.

By 2016, HCMUNRE has more than 8,500 students at three levels: Bachelor, College and working students; Graduate (planed to start in 2017); 01 international collaboration education program on Master of Applied Sustainability Science (will launch on the end of 2017). The university has more than 300 lecturers, including 3 professors, 13 associated professors, 45 PhDs and 185 Masters.

HCMUNRE has 4 computer labs, 1 Environmental Lab., 1 Water supply and drainage practicing lab., 1 Mineral and Petrography lab, 1 Geo Technique lab, practising equipment for Geodesy and Mapping such as Trimble 5700, GPS SR20…

It has 12 Faculties including**:** Environment; Methodology Hydrology and Climate Changes; Land Administration; Geodesy and Mapping; Geology; Economics of Natural Resources and Environment; Informatics and Remote sensing; Sea and islands management; Energy and Renewable Energy; Water Resources; Fundamental sciences; and Political science

It also has 4 Institutes/Centers such as: Institute of Environment and Sustainable Development; Center of Environment and Natural Resources Consultancy and Services; Training and Education Center; and Center of Language and Informatic training.

5.6.1. Strengths

- HCMUNRE is one of the only two Universities which belong to Ministry of Natural Resources and Environment (MONRE) so that it receives direct supports and instruction from MONRE. It also has strong links with provincial/local authorities and DONRE.
- HCMUNRE has professional faculty members and staffs and meet requirements for training, researching in multidiscipline fields.
- HCMUNRE is young and new University and most researchers and teachers are young so that they are very eager and enthusiasm to learn the new things and to be challenged.
- HCMUNRE has established the tight relationship with different research institutes, universities, and colleges in the nation and other countries as Japan, USA, Thailand, China, Finland, Sweden, Korea, etc. on natural resources, environment, sustainabiliies, renewable energy, nanotechnologies, green technology and production, etc.
- HCMUNRE locates in the HoChiMinh City which is one of the most dynamic cities in Vietnam so that there are many problems and challenges need to be solved. High demand of energy, life quality improvement, traffic jam, public transportation, shortage of housing, are the facing problems of this City. They are also very attractive to study.

5.6.2. Weaknesses

- HCMUNRE is upgraded to University level for last 5 years, there still exist some constraints of infrastructure, physical conditions and space for the existing fast growing rate.

- The young teachers, which occupy the majority, are lack of practical experiments and research skills therefore, the opportunity to draw the large-fund project is limited. They also less competitive capacity compared with those from the big and well-known universities.
- HCMUNRE lacks of the modern facilities, laboratories and advanced equipment for experiments and researches.

5.6.3. Improvement Plan

- The University plans to move to the new location and larger area but still in HCM City for growing and further developing.
- Joint with other Universities and researchers in Vietnam and around the world to solve issues of environmental and natural resources management in Vietnam.
- Become the sustainable, reliable and strong bridge/linkage between the government (MONRE) and communities and enterprises.
- Develop more applicable researches to improve the quality of life and environment quality.
- Develop the new education program to respond to the emerged environmental and natural resources problems and demand of the job-market.
- Commit to allocate the budget for developing infrastructure and advanced laboratories and field experiment.

5.6.4. Curriculum Design and Review

In HCMUNRE, all the process of curriculum design and review should follow the regulations of both Ministry of Natural Resources and Environment and Ministry of Education and Training. The existing education and training will be reviewed and updated after 4 -5 years of implementation.

- Step 1: Each Faculty has established the Faculty Science Committee who will review and approve the proposal of the Dean for any new discipline and updated the curricula. The Committee has the representatives as Division's head, experience lecturers, experts of fields/specialized fields and external representatives from employers;
- Step 2: For the new fields or education program such as sustainability and renewable energy, etc. the survey on needs and markets and contents of education program will be conducted after the proposal approval.
- Step 3: The Faculty members and lecturers will develop the program and detailed contents and submit to the Faculty Science Committee for reviewing and approving again.
- Step 4: The revised education program and curricula will be submitted to the University Science Concil and HCMUNRE Department of Education and Training for evaluating and approving.
- Step 5: The final education program and curricula will be issued by the Rector of HCMUNRE before implementation. For the new education program they will continue the process to the higher levels at Ministry of of Natural Resources and Environment and Ministry of Education and Training. The approved program will be issued by Minister of Ministry of Education and Training.

6. Plan for the placement of the SSVC course in each Vietnamese partner university curricula

All Vietnamese partner universities have 2 main semesters (September – December and January – May) and 1 summer semester (option).

- May 2017: Participate the ToT training of SAUNAC program
- Sep. –Dec., 2017: Introduce at least one course on sustainability principles for students of involved Faculties, Departments of the universities.
- Sep., 2017: conduct 1st pilot course design at HCMUNRE in 1 week with EU support.
- In 2017: joint the meeting on the final contents of the course in Haiphong University for 3 days.
- From March 2018 run the 2nd pilot course for 2 weeks
- From Sep. 2018 – June 2019 run the 3rd pilot course

6.1. Plan for VNU University of Science, Vietnam National University

SSVC-Module	integrated	x	elective	x	
	Bachelor	x	Master	x	
	Name of the course				
	Name of the course				
	Semester	5		1	
	Number of students	30		10	
	Starting Date	after pilot 2			

		Name	Email
Responsible Person for SSVC:		Nguyen Xuan Hai	nguyenxuanhai@hus.edu.vn
Lecturers for SSVC:	1	Nguyen Xuan Hai	nguyenxuanhai@hus.edu.vn
	2	Nguyen Thi Ha	nguyenthiha@hus.edu.vn
	3	Vu Van Manh	vuvanmanh@hus.edu.vn
	4	Bui Quang Thanh	qthanh.bui@gmail.com
	5	Nguyen Thi Hoang Lien	nguyenthihoan-glien@hus.edu.vn
	6	Nguyen Thi Kim Hoa	kimhoaxhh@yahoo.com

Teaching Methods	*Actually Used*		*Planned for SSVC*	
	Conventional	x	Conventional	
	Blended Learning		Blended Learning	x
	Practice	x	Practice	x
	ELearning		ELearning	x
	Project	x	Project	x

Areas	Topics	Very Important	Important	Maybe	Department of VNUN-HUS
Buildings and Energy	Building Construction and Demolition				not applicable
	(Building-) Energy Efficiency				not applicable
	(Decentralized) Energy Supply				not applicable
	Renewable Energy	x			Faculty of Environmental Science
	Sector Coupling (Gas, Oil, Heating/Cooling, Electricity)				not applicable
	Demand Side Management (DSM)				not applicable

Transportation	Municipal transportation systems		x		not applicable
	Transportation Challenges		x		not applicable
	Air pollution control in urban and cities	x			Faculty of Environmental Science
Water & Green Infrastructure	Waste Management (Recycling)	x			Faculty of Environmental Science
	Water Management	x			Faculty of Environmental Science
	Waste Water Management	x			Faculty of Environmental Science
Land Use and Planning	Overview of Municipal Land Use	x			Faculty of Geography
	Environmental Challenges by the Municipal Land Use	x			Faculty of Geography
	Industry	x			Faculty of Environmental Science
	Trading		x		not applicable
	GIS for land use management	x			Faculty of Environmental Science
Food System	Sustainable Local Food system		x		not applicable
	Sustainable Food Purchasing		x		not applicable
	Food Access & Food Security		x		not applicable
	Food Toxicology	x			Faculty of Environmental Science
Community	Social Life			x	Faculty of Sociology, VNU-USSH
	Quality of Life			x	Faculty of Sociology, VNU-USSH
	Demographic change			x	Faculty of Sociology, VNU-USSH
	Social Insurances			x	Faculty of Sociology, VNU-USSH
	Risk assessment and communication	x			Faculty of Environmental Science

6.2. Plan for National University of Construction and Engineering

SSVC-Module	integrated	x	elective	x	
	Bachelor	x	Master	x	
	Name of the course				
	Name of the course				
	Semester	5		1	
	Number of students	30		10	
	Starting Date	after pilot 2			

		Name	Email
Responsible Person for SSVC:		Nguyen Viet Anh	anhnv@nuce.edu.vn
Lecturers for SSVC:	1	Nguyen Viet Anh	anhnv@nuce.edu.vn
	2	Nguyen Phuong Thao	phuongthaodhxd@gmail.com
	3	Do Hong Anh	honganh_dhxd@yahoo.com
	4	Nguyen Lan Huong	lanhuong1184@gmail.com

Teaching Methods	*Actually Used*		*Planned for SSVC*		
	Conventional	x	Conventional		
	Blended Learning		Blended Learning	x	
	Practice	x	Practice	x	
	ELearning		ELearning	x	
	Project	x	Project	x	

Areas	Topics	Very Important	Important	May be	Department of NUCE
Buildings and Energy	Building Construction and Demolition	x			Department of Architecture and Planning; Department of Construction
	(Building-) Energy Efficiency	x			Department of Environmental Engineering; Department of Architecture and Planning;
	(Decentralized) Energy Supply	x			Department of Environmental Engineering
	Renewable Energy	x			Department of Environmental Engineering
	Sector Coupling (Gas, Oil, Heating/Cooling, Electricity)		x		Department of Environmental Engineering

	Demand Side Management (DSM)		x		Department of Environmental Engineering; Department of Architecture and Planning;
Transportation	Municipal transportation systems			x	Department of road and infrastructure
	Transportation Challenges			x	Department of road and infrastructure
Water & Green Infrastructure [HUCE proposes to add topics:]	Water Management	x			Division of Water Supply and Sanitation
	Wastewater Management	x			Division of Water Supply and Sanitation
	Low carbon infrastructure & green buildings	x			Department of Environmental Engineering; Department of Architecture and Planning;
	Waste Management (Recycling)	x			Department of Environmental Engineering
Land Use and Planning	Overview of Municipal Land Use	x			Faculty of Architecture and Planning
	Environmental Challenges by the Municipal Land Use	x			Department of Environmental Engineering; Department of Architecture and Planning;
	Industry		x		Department of Environmental Engineering; Department of Architecture and Planning;
	Trading		x		All departments
Food System	Sustainable Local Food system		x		not applicable
	Sustainable Food Purchasing		x		not applicable
	Food Access & Food Security		x		not applicable
Community	Social Life			x	All departments
	Quality of Life			x	All departments
	Demographic change			x	All departments
	Social Insurances			x	All departments

6.3. Plan for Hai Phong University

SSVC-Module	integrated	x	elective		
	Bachelor	x	Master		
	Name of the course	Economics, Business, Construction Economics			
	Name of the course				
	Semester				
	Number of students	20			
	Starting Date	we suggest starting the 2nd pilot at the beginning of each semester			

		Name	Email
Responsible Person for SSVC:		Mr. Doan Quang Manh	hieupho3.thp@moet.edu.vn
Lecturers for SSVC:	1	Ms Pham Thi Phuong	phu-ongpham1010hp@gmail.com
	2	Ms Nguyen Thi Tuyen	nguyen-tuyenhpvn@gmail.com
	3	Ms Dinh Minh Thu	minhthu.knn.dhhp@gmail.com
	4	Mr Nguyen Tri Long	longcac-tus.hp@gmail.com
	5	Mr Bui Van Bien	bienbv80@dhhp.edu.vn

Teaching Methods	*Actually Used*		*Planned for SSVC*		
	Conven-tional	X	Conventional		
	Blended Learning	x	Blended Learning	x	
	Practice		Practice	x	
	ELearning	X	ELearning	x	
	Project		Project	x	

Areas	Topics	Very Im-portant	Im-portant	May be	Department of UHP
Buildings and Energy	Building Construction and Demolition			x	Faculty of Construction
	(Building-) Energy Effi-ciency		x		Faculty of Construction

	(Decentralized) Energy Supply	x			
	Renewable Energy		x		
	Sector Coupling (Gas, Oil, Heating/Cooling, Electricity)	x			
	Demand Side Management (DSM)	x			
Transportation	Municipal transportation systems	x			Faculty of Economics and Business Administration
	Transportation Challenges		x		Faculty of Economics and Business Administration
Water & Green Infrastructure	Waste Management (Recycling)	x			
	Water Management	x			
	Waste Water Management	x			
Land Use and Planning	Overview of Municipal Land Use		x		Faculty of Construction
	Environmental Challenges by the Municipal Land Use	x			Faculty of Construction
	Industry	x			
	Trading		x		
Food System	Sustainable Local Food system	x			Institute of Bio-agricultural Research & Development
	Sustainable Food Purchasing		x		
	Food Access & Food Security	x			Institute of Bio-agricultural Research & Development
Community	Social Life	x			Faculty of Tourism
	Quality of Life	x			Faculty of Tourism
	Demographic change		x	x	
	Social Insurances	x			Faculty of Tourism

6.4. Plan for Hue University of Science

SSVC-Module	integrated	x	elective	x	
	Bachelor	x	Master	x	
	Name of the course				
	Name of the course				
	Semester	5		1	
	Number of students	30		10	
	Starting Date	after pilot 2			

		Name	Email
Responsible Person for SSVC:		Duong Van Hieu	dvhieu@hueuni.edu.vn
Lecturers for SSVC:	1	Tran Anh Tuan	tuantrankhmt@gmail.com
	2	Pham Khac Lieu	pklieu@yahoo.com
	3	Hoang Cong Tin	hoangcongtin@gmail.com
	4	Tran Nguyen Quynh Anh	quyn-hanhtn20286@gmail.com

Teaching Methods	*Actually Used*		*Planned for SSVC*	
	Conventional	x	Conventional	
	Blended Learning		Blended Learning	x
	Practice	x	Practice	x
	ELearning		ELearning	x
	Project	x	Project	x

Areas	Topics	Very Important	Important	May be	Department of HUS
Buildings and Energy	Building Construction and Demolition	x			NA
	(Building-) Energy Efficiency	x			Department of Environmental Science
	(Decentralized) Energy Supply	x			NA
	Renewable Energy	x			NA

	Sector Coupling (Gas, Oil, Heating/Cooling, Electric-ity)		x		NA
	Demand Side Management (DSM)		x		Department of Envi-ronmental Science
Transportation	Municipal transportation systems		x		NA
	Transportation Challenges		x		NA
Water & Green Infrastructure	Waste Management (Recy-cling)	x			Department of Envi-ronmental Science
	Water Management	x			Department of Envi-ronmental Science
	Waste Water Management	x			Department of Envi-ronmental Science
HUS propose to add topic	Municipal solid waste Man-agement	x			Department of Envi-ronmental Science
Land Use and Planning	Overview of Municipal Land Use	x			Department of Envi-ronmental Science
	Environmental Challenges by the Municipal Land Use	x			Department of Envi-ronmental Science
	Industry		x		
	Trading		x		
Food System	Sustainable Local Food sys-tem		x		NA
	Sustainable Food Purchas-ing		x		NA
	Food Access & Food Secu-rity	x			Department of Envi-ronmental Science
HUS propose to add topic	Food Safety and Commu-nity health	x			Department of Envi-ronmental Science
Community	Social Life			x	
	Quality of Life			x	
	Demographic change			x	
	Social Insurances			x	
HUS propose to add topic	Environmental management base community		x		Department of Envi-ronmental Science

6.5. Plan for Da Nang University of Science and Technology

SSVC-Module	integrated	X	elective	X	
	Bachelor	X	Master	X	
	Name of the course				
	Name of the course				
	Semester	6		1	
	Number of students	20		10	
	Starting Date	after pilot 2			

		Name	Email	
Responsible Person for SSVC:		Phan Nhu Thuc, PhD.	pnthuc@dut.udn.vn	
Lecturers for SSVC:	1	Phan Nhu Thuc, PhD.	pnthuc@dut.udn.vn	
	2	Tran Van Quang, Assoc. Prof.	tvquang@dut.udn.vn	
	3	Hoang Hai, PhD.	haivn87@hotmail.com	
	4	Le Nang Dinh, PhD.	lndinh@dut.udn.vn	

Teaching Methods	*Actually Used*		*Planned for SSVC*		
	Conventional	X	Conventional		
	Blended Learning		Blended Learning	X	
	Practice	X	Practice	X	
	ELearning		ELearning	X	
	Project	X	Project	X	

Areas	Topics	Very Important	Important	Maybe	Department of DUT
Buildings and Energy	Building Construction and Demolition		X		Faculty of Civil Engineering
	(Building-) Energy Efficiency	X			Faculty of Electrical Engineering
	(Decentralized) Energy Supply		X		Faculty of Electrical Engineering
	Renewable Energy	X			Faculty of Thermal and Refrigeration Engineering
	Sector Coupling (Gas, Oil, Heating/Cooling, Electricity)				

	Demand Side Management (DSM)				
Transportation	Municipal transportation systems	X			Faculty of Transportation Mechanical Engineering
	Transportation Challenges	X			Faculty of Road and Bridge Engineering
Water & Green Infrastructure	Waste Management (Recycling)	X			Faculty of Environment
	Water Management	X			Faculty of Environment
	Waste Water Management	X			Faculty of Environment
Land Use and Planning	Overview of Municipal Land Use		X		Faculty of Architecture
	Environmental Challenges by the Municipal Land Use	X			Faculty of Environment
	Industry		X		Faculty of Project Management
	Trading		X		Faculty of Project Management
Food System	Sustainable Local Food system		X		Faculty of Chemistry
	Sustainable Food Purchasing		X		Faculty of Chemistry
	Food Access & Food Security	X			Faculty of Chemistry
Community	Social Life				
	Quality of Life				
	Demographic change				
	Social Insurances				

6.6. Plan for Ho Chi Minh University of Natural Resources and Environment

SSVC-Module integrated ☐ elective ☐

	Bachelor		Master		
	Name of the course				
	Name of the course				
	Semester				
	Number of students				
	Starting Date				

		Name	Email
Responsible Person for SSVC:		Dinh Tuan PHAN	pdtuan@hcmunre.edu.vn
Lecturers for SSVC:	1	Thi Van Ha NGUYEN	ntvha2003@gmail.com
	2	Thi Thanh Van HO	httvan@hcmunre.edu.vn
	3		
	4		

Teaching Methods	*Actually Used*		*Planned for SSVC*		
	Conventional	x	Conventional		
	Blended Learning	x	Blended Learning		
	Practice	x	Practice	x	
	ELearning		ELearning	x	
	Project		Project	x	

Areas	Topics	Very Important	Important	May be	Department of HCMUNRE
Buildings and Energy	Building Construction and Demolition			x	
	(Building-) Energy Efficiency	x			Faculty of Energy and Renewable Energy
	(Decentralized) Energy Supply	x			Faculty of Energy and Renewable Energy
	Renewable Energy	x			Faculty of Energy and Renewable Energy; Faculty of Environment
	Sector Coupling (Gas, Oil, Heating/Cooling, Electricity)	x			
	Demand Side Management (DSM)		x		

Transportation	Municipal transportation systems	x			
	Transportation Challenges		x		
	Traffic jam	x			
Water & Green Infrastructure	Waste Management (Recycling)	x			Faculty of Environment
	Water Management	x			Faculty of Environment
	Waste Water Management	x			Faculty of Environment
	Water supply and drainage system		x		Faculty of Environment
	Flooding	x			Faculty of Environment
Land Use and Planning	Overview of Municipal Land Use		x		
	Environmental Challenges by the Municipal Land Use	x			Faculty of Environment
	Industry	x			
	Trading	x			Faculty of Economics of Natural Resources and Environment
Food System	Sustainable Local Food system	x			
	Sustainable Food Purchasing	x			
	Food Access & Food Security	x			
	Food quality and sanitation				Faculty of Environment
Community	Social Life		x		
	Quality of Life	x			Faculty of Environment
	Demographic change		x		
	Social Insurances	x			
	Environmental and Health		x		Faculty of Environment

Conclusions

Environmental and urban planning is a complex activity; it is one of the most important components of national development strategy. Environmental and urban planning plans should be a good combination between conservation, rehabilitation and re-construction, rational natural resources management. It should apply advanced science and technology and new techniques to establish a modern urban that will become capable of dealing with and adapt to impacts of global of climate change.

The urban planning system of Vietnam is fragmented and need the collaboration between agencies involving plan preparation and implementation. Beside, Vietnam also needs to improve the environmental and urban plan profession. Knowledge acquisition is an important part, and for that education, training, research and information resources play a key part.

In addition, Vietnam should have to care about building a National urban development database system and Environmental Information System to support policy construction management, improve the international cooperation, carry out scientific research, learn experience, expand conditions and opportunity for investor toward environmental friendly and smart sustainable urban, mobilize all social resources.

To evaluate the needs and state of the art of the Vietnamese partners a questionnaire has been carried out in WP1. The outcome of the questionnaire shows that in terms of the content for the SSVC courses there are six most important topics for all Vietnamese universities.

1. Environmental Challenges by the Municipal Land Use
2. Renewable Energy
3. Waste, Water and Waste Water Management (Recycling)
4. Food Access & Food security
5. (Building-) Energy Efficiency
6. (Decentralized) Energy Supply

Anyway, there is a spreading among the universities concerning the importance of the topics. Due to the geographical situation, climate conditions etc. there are different needs and problems in each city and university.
Apart from the content for the courses, the questionnaire considers the teaching methods that are currently used and those that should be used in the future.
According to the questionnaire, all Vietnamese partners are using conventional teaching methods. Practices and projects are also implemented at the majority of the universities. Even though two universities have been testing blended learning it is not a permanently used or well-known method. Blended Learning, Practice, E-Learning and Projects are methods that nearly all partners wish to make use of in the future.

That leads to the following advices for the development of the SSVC courses. At least three of the main topics should be considered. Since the topics are overlapping, a combination is recommended. The topics 2, 5 and 6 can be easily summarized in a topic called “Renewable and Decentralized Energy Supply and Efficiency“. That leads to four main topics. To regard the slightly different interests of the partners it would be useful to have general and mandatory courses for all partners and additional and selectable courses to specialize in one topic. For example, the specialisation could take place in the projects.
Besides that, the lecture coverage for the main topics must be reconsidered during the development of the tailor courses. If there are universities that are incapable of giving lectures in all topics, this must be communicated early on. Other universities could send professors or E-Learning courses can be developed to offset the lack of teaching staff.
Since there is little to no knowledge or experience in the field of blended learning but a strong will to use this method, this should be in the focus of the following work packages as well. The experiences from the Train the Trainers Workshop in Hanoi are the foundation and should be further developed.

Tien, N.H. (2013). Vietnam urban water supply and sewerage development programme, orientation. ASEAN Water Forum – Promoting Sustainable Development Investment held on 17th October 2013 in Ho Chi Minh city, Vietnam.

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.