

ANALYSING THE URBAN MORPHOLOGY OF HOI AN ANCIENT CITY, QUANG NAM PROVINCE IN SUSTAINABLE COASTAL TOURISM, VISION TO 2045

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(Received: September 02, 2024; Revised: October 14, 2024; Accepted: October 15, 2024)

DOI: 10.31130/ud-jst.2024.547E

Abstract – Hoi An ancient city being favorable location played an important role as a commercial center during the past to nowadays, especially Faifo commercial port in 14th century. Hoi An is a huge potential tourism in unique heritage mixing diverse nature. However, expanding Hoi An urban serving tourism development has negatively affected the diverse Hoi An's ecosystem. Meanwhile, Hoi An's urban planning solutions didn't get the effective results, because of less analyzing urban morphology trends which find out transformation of land use's shape as well as population density. From that, the following article will: (i) analyze the urban development context of Hoi An city, (ii) analyze the urban spatial morphology and (iii) propose solutions to apply TDR (Transfer Development of Right) model, that considered as useful method for sustainable coastal and river urban planning in Hoi An, as well as enhances the ability coping to climate change and extreme weather.

Key words – Urban morphology; Urban tourism; Sustainable planning; Land use transformation; Transfer of development rights (TDR).

1. Introduction

Since the early 14th century, Faifo ancient town (Hoi An) always played an important role in connecting neighboring areas through commercial activities on rivers and ports which attracted many foreign merchants, such as Japan, China, Cambodia, etc. [1]. In the present, Hoi An always leads in the number of tourists per year compared with others, because it owns two world heritages: cultural heritage - Hoi An Ancient Town _1999 and natural heritage - Cu Lao Cham Biosphere Reserve _2009 [2].

Moreover, because natural resources and tangible_intangible culture are diverse, whole of Hoi An's coastal urban system has the trend of developing along the 1A highway and Lac Long Quan streets. There are a tourism services, eco-tourism, public parks located on two sides of that [3]. In the strategies for developing the coastal urban, the government said that Hoi An will become the dynamic economic cluster in the North of Dien Ban - Hoi An - Dai Loc in connecting with Da Nang's economic key.

When it comes to the potential tourism system, Hoi An belongs to the Hue – Da Nang - Hoi An tourism as well as 3 national tourism including Son Tra, Ba Na (Da Nang), and Cu Lao Cham (Quang Nam). Moreover, Hoi An is also one of the "Central Heritage Road" tourists which is

oriented to be linked to the "Indochina Heritage Road" including the World Cultural Heritage of Luang Prabang Ancient Capital (Laos) and Angkor Wat complex (Cambodia) [1, 4]. It is clear that Hoi An ancient city has been retained the intact Faifo port (Hoi An) with the typical form of a port and trading center. In which the commercial streets had an architectural diverse culture of Vietnam, China, Japan, and Europe) [5].

Besides the advantages of economic tourism growth from exploiting natural and cultural resources, the issues of environmental protection, climate change adaptation, and local cultural preserves are always a major challenge globally in the 4.0 technology [6], so Hoi An Ancient City is no exception.

Therefore, "Analyzing the urban morphology of Hoi An ancient city, Quang Nam province in sustainable coastal tourism, vision to 2045" becomes urgent in orienting the urban tourism planning followed by sustainable development and local cultural values preserve.

2. Background

2.1. Location

Hoi An ancient city is located on the North of the Thu Bon River; Coordinates: 15015'26" _15055'15" N and 108017'08" _108023'10" E; distance of 9 km of 1A highway in the East, 25 km of Da Nang city in the North, and 50 km of Tamky city in the South [7].

2.2. Climate

Hoi An belongs to the tropical monsoon climate of the South Hai Van, including hot and humid, lots of rain, high temperature, sunshine, little affected by the winter monsoon:

- Average temperature: 23 - 24°C (winter), 34-42°C (summer). Average hours per year: 1,851 hours.

- Average rainfall: 2,069mm, on average 120 - 140 rainy days per year (September - December).

2.3. Terrain

Hoi An played on a plain with a small slope, close to the coastal area, formed on the sand dunes of the river mouth, whole of terrain is gentle sand hills, with an average slope of 0.015, gradually decreasing from the North to the South.

2.4. River system

Hoi An's river system includes Thu Bon river (length: 8.5km; width: 120 - 240m; basin: 3,510 km²) and De Vong river (from Dien Duong to the East_North of Hoi An, length: 8.5km; width: 80 - 100m) [8].



Figure 1. Location map of Hoi An ancient Town, Quang Nam province (Source: Authors drawing from Quangnam data)

3. Urban context

3.1. Potential and challenge

3.1.1. Potential

* *Natural resources*: Hoi An is located in the downstream river, so that it has rare flora and fauna for ensuring ecological balance, like biosphere reserve of Cu Lao Cham Island cluster having 8 large_small islands and 7km coastline of Hoi An still retaining its pristine landscape. It is a favorable condition for developing beach tourism [8].

* *Tangible cultural resources*: Hoi An ancient city was recognized by UNESCO as a World Cultural Heritage in 1999 and a special national monument in 2009 [6]. Furthermore, Hoi An has many historical values and old town, because it has a long-standing residents as well as trading place of Champa and 4 long-standing craft villages such as Camkim's Mat, Thanhha's Pottery, Traque's Vegetable and Kimbong's carpentry [8].

* *Intangible cultural resources*: Hoi An ancient city was a common place where intersect other cultures, such as Cham - Vietnamese - Chinese - Japanese - Indian - French - American civilizations, as well as the birthplace of the National Language in the 17th century. There are 3 major traditional cultures, such as: (1). Carving art: expressing in sculptures, wood carvings, porcelain reliefs; (2). The art of singing Ba Trao; (3). Traditional craft villages: agriculture, seafood, traditional medicine, carpentry, tailoring [9].

* *Regional connectivity*: Hoi An ancient city is oriented to the dynamic cluster center of Quangnam province in the North, while belongs to the transportation system linking amongs Hoi An and Quangnam's inside_outside (Da Nang, Quangngai and the mountainous of Quangnam in the North such as Donggiang, Taygiang, Namgiang). These areas are connected by mainroads, railways, coastal roads and highways [10].

3.1.2. Challenges

* *Extreme weather*: high tides to 3.5 meters, super typhoons, upstream floods, rising sea levels, coastal erosion at Cua Dai beach, changes of coastal structure. These can affect directly to coastal infrastructure system, resident's livelihoods and coastal tourism models [11].

* *Limiting land funds*: expanding coastal urban for serving tourism needs a large land fund, so that agricultural land convert to urban land such as the land of housing, services, centers, street, public transportation, etc. Meanwhile, agricultural land areas are increasingly narrowed in converting other functions [11].

* *New tourism destinations*: whole of exploring economic tourism benefits from local culture and natural landscapes, so that finding new tourist destinations as well as preserving cultural values always are a huge challenge for the local tourism industry [11].

3.2. Urban planning and prediction

3.2.1. Status

Hoi An's urban planning projects including forecasting population, land use planning, the trends of expanding urban have a lack of accuracy level as well as management methods. So that, it isn't only difficulty for identifying morphology urban, but also directly affects to the process of planning land use structure and orienting Hoi An's spatial urban structure. Moreover, landscape and agricultural space are affected due to the difficulty in determining the scale, function and location in orientating urban development. Even, there are a lots of suspended projects, due to the lack of impossible ability [11].

3.2.2. Orientation

According to the national master plans for Vietnam's coastal urban, Hoi An is oriented to: (1). Developing Hoi An ancient city as a core tourism urban in the triangle of international heritage: Hoi An - Culaocham - Myson, forming the Hoi An urban cluster with Dienban and Duyxuyen; (2). Specializing cultural tourism urban at the provincial and national levels including resorts, culture and festival events with the national and international levels. Hoi An's choiced_tourism model is a sustainable culture and ecology; (3). Developing smart urban, adapting to climate change for Hoi An's ancient city [12]. Specifically:

- Developing an Ecological - Cultural - Tourism urban with the preservation of historical and cultural values;
- Towards Hoi An's cutting_edges technology urban, vision to 2030;
- Expanding the sustainable urban adapting to climate change as well as increasing resilience to extreme weather;
- Promoting the integration process and linking regions create the premise for green urban growth.

3.2.3. Tourist arrivals forecast

Formula for forecasting the number of visitors from population conversion [12]:

$Q_{1,2} = \frac{2 \times Q_t \times m}{365}$	Forecast 2035	Forecast 2045
	9.852.000 (42%)	15.270.000 (45%)

In which: Q1,2: Number of temporary residents (people); Qt: Number of temporary visitors (turns); m: Average number of temporary days of a visitor (days).



Figure 2. The map of Land use planning in Hoi An in 2030
(Source: Quang Nam's Department of Construction)

4. Analysing Hoi An morphology

4.1. Land use structure

Urban development and expansion in Hoi An's city have significantly changed the area and function. Meanwhile, natural land area has been exploited in an unecological way for serving tourism industry, so that the agricultural land area has been increasingly narrowed to about 17% of the total land area.

Especially, after being recognized as a cultural heritage urban in 1999, Hoi An's government continuously expanded the land area for building new urban areas and tourism facilities has increased rapidly. Whole of land funds focus on building the infrastructure system, commercial and service works, such as increasing rapidly mainroad, highway traffic, while riverine traffic has not changed.

4.2. Urban morphology

4.2.1. Hoi An's ancient city

Because of natural diversity, Hoi An urban morphology have been maintained the interweaving of architectural works (old town, Hoi An port, residential areas) with ecological landscapes including the greenery and water surfaces (Coco river, Cuadai beach) during the process of expanding urban. It is lucky for Hoi An to be uninfluenced by urbanization.

Based on the analysis of the history of Hoi An urban formation in the periods of 2005-2024: In Figure 4, Hoi An's urban expansion have been tends to develop the South of Hoi An, because of historical rivers and water. In which, new residential clusters are based on existing residential clusters where maybe contain old villages, vestiges communal houses. These had been constructed the low density having garden and low-rise.

Because expanding urban from existing village clusters, Hoi An urban have been retained the green spaces

in separating amongst urban clusters and creating a typical urban structure called "Village in the city_ City in the village (ViC_CiV)", leading to be suitable urban form for developing eco_tourism. Meanwhile, heritage conservation areas were strictly managed, as well as the ancient urban structure having adjacent residential and business houses were preserved. It means that there are many advantages in terms of landscape and ecological environment, so that expanding urban with ViC_CiV model can be easily gains the consensus of local residents. And then developing biodiversity and culture tourism of Hoi An will be supported by the urban users.

4.2.2. Coastal Urban

Before, Hoi An population was low density, there were a litle resident clusters mainly focusing on beaches with fishing life, and then developing to fishing villages, while others people began to aquaculture along Thu Bon and Co Co rivers.

Until 1999, Hoi An city was recognized as a world cultural heritage urban, fishing residents weren't only exploiting aquaculture far away the beach but also beginning to serve coastal tourism, even developing the coastal industry like Chu Lai economic zone. As that time, forming residential areas were necessary.

By 2005, there were a number of public works and services tourism being built and expanded rapidly until 2015. Especially, the coastal tourism projects were strongly developed in 2020, such as resorts, coastal apartments, condol hotel, coastal public services, etc. However, when the COVID-19 epidemic broke out, there were numb in tourism activities globally from 2020 to 2023 around the world, while Hoi An was no exception. So that, the whole of coastal planning projects in Hoi An were frozen during this period. In the last 6 months of 2023, when COVID-19 was controlled completely, Hoi An government restarted the planning projects related to urban development.

Although there are experienced many stages of development urban, Hoi An coastal urban morphology always had a chain form stretching along the coast with urban functions clinging to both sides of Lac Long Quan Street near the beach.

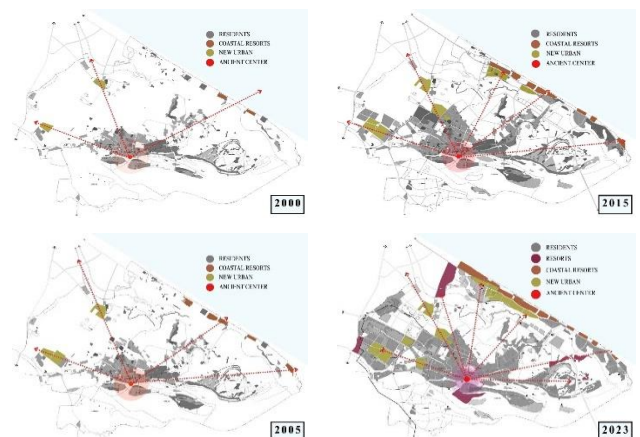


Figure 3. Analyzing urban morphology and urban expansion trends of Hoi An in the period 2000-2023 (Source: Authors)

5. Proposing TDR's method for Hoi An strategy planning in Hoi An coastal/riverside urban

5.1. Viewpoints

- Maintaining the trend of urban expansion toward the sea;
- Protecting vulnerable beaches, and extreme weather areas;
- Limiting the speed of coastal urbanization by using the greenery corridor solutions;
- Allowing to construction of the temporary works, in order to be easily replaced without affecting the beach ecosystem;
- Enhancing the resilience of coastal risks;
- Incorporating sustainable infrastructural systems into urban spaces, such as streets, squares, urban parks, etc;
- Promoting the awareness of tourists and locals.

5.2. Transfer of Development Rights (TDR's method)

TDR mechanism allows the right to develop space (in square meters of construction floor space) to be transferred from one location to another through the forms of buying, selling, exchanging, giving, and receiving. There are a lot of pros and cons to implementing this model:

TDR's pros: developing unused or restricted space effectively, in order to preserve heritage buildings, creating open spaces, and protecting environmentally and ecologically sensitive areas, because of reclaiming available urban infrastructure. It means that TDR's mechanism can overcome two main causes of major urban problems effectively: (1). Lack of consensus among social components by balancing citizen benefits and (2). Difficulty in mobilizing maximum resources (land and finance) to solve urban problems [13], [14].

From the analysis of the trends of coastal urban expansion in Hoi An urban depending on the river and sea basin system (Ite. 3.2.b), the coastal land shape is freely based on coastal terrain and structure.

Therefore, the land use structure is spread out, leading to ineffective coastal planning in building the compacted infrastructure recognized by planners about economic sustainability and investment costs. Meanwhile, sustainability is considered a priority criterion in coastal and riverside urban planning.

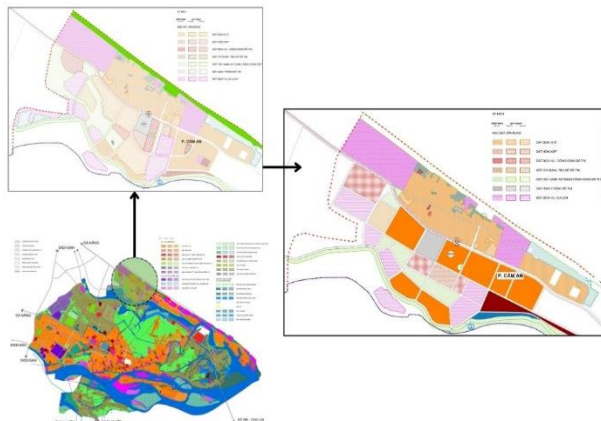


Figure 6. Applying TDR restructuring land use, ex: Caman ward (Source: Authors)

Based on the characteristics of Hoi An being a diverse river system linking directly to the sea, Hoi An land use structure with an uniform shape should restruct coastal/river urban in the grid planning which saves infrastructure investment, narrows the movement distance, and shares public services. Because any planning model instead of the grid causes a waste of land resources in some areas far from the center due to the spread of population and infrastructure. Meanwhile, some of Hoi An's central areas along the rivers are seriously lacking in green trees.

Therefore, the re-division of land use structure according to the TDR mechanism will be more effective in designing a grid-shaped road network and increasing land funds for green trees and public parks.

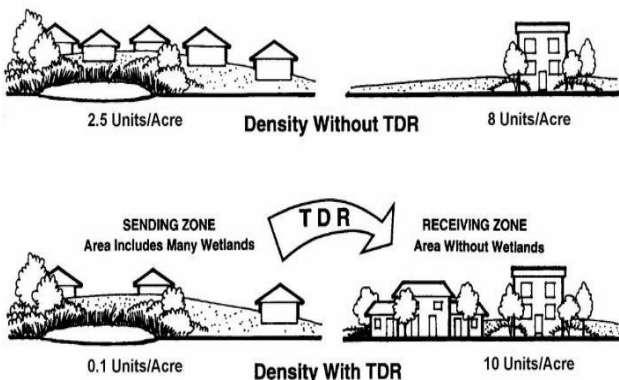


Figure 4. The process of TDR model

TDR's method applying to Hoi An coastal/riverside urban is described in below:

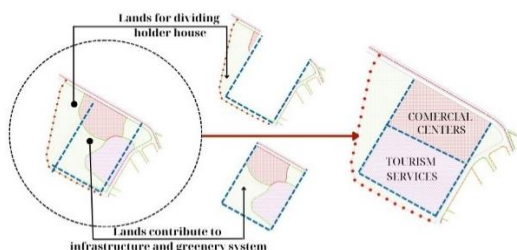


Figure 5. Presenting TDR restructuring land use, ex: Caman's commercial center (Source: Authors)

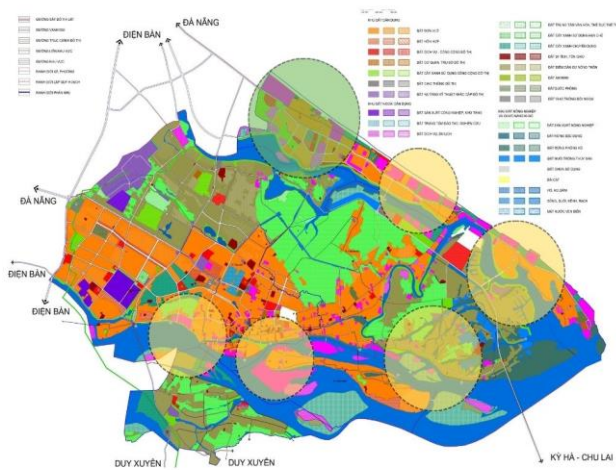


Figure 7. Proposed the useful locations in Hoi An applying TDR mechanism

6. Conclusion

Hoi An City has a lot of extreme potential for tourism in the economic growth not only in the central region in general but also in the locality in particular. Moreover, Hoi An is oriented as a key economic of the Middle in the strategies of national marine economic development. Therefore, the expansion of sustainable urban planning is considered the priority task in expanding and developing coastal/river urban adapt to climate change and be resilient to extreme weather. However, it also is an existing challenge for any coastal tourism city.

There are a lot of methods for improving the effectiveness of urban planning, it is believed that urban morphology analysis is a useful method to find urban development trends, thereby proposing sustainable solutions for effective land use restructuring in the urban context. Within the limits of the article, the authors please to propose the TDR model for Hoi An's somewhere having immunity to urbanization and unused land funds.

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