

Resettlement and Rural Housing for Flood-Stricken Areas

in Mekong River Basin of Vietnam

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Abstract

Rural development with strategies of Mekong river delta field zone, during the period 1996-2010, will deal the researching, the investigation and constructing the buildings to protect the life, properties, and also to protect the harvest of populations. It has significance on economic, social, political aspects. It warrants the productivities and life will be stable during annual flood season, therefore the long-term orientation are planning and constructing the dwelling in Mekong river field zone.

The 5 years plans, 1996-2000 for developing transportation, hydraulics and rural housing so that research and investigation constructions are urgent requirements of flood areas for providing the basic services to the community such as health, education, transportation system, water and electricity system. With that ambition, the government has the projects in planning for improving the population's condition, also population living and expecting in flood areas as safe as possible.

The present paper examines the implementation of a small-scale experimental project in flood prone areas, and also the resettlement policy of population to new cluster. The results, it could be widely applied in Mekong delta.

Introduction

Over recent years, the southern part of Vietnam is rapidly changing; particularly the Southern field provinces has been the fastest growing region of Vietnam in agriculture gross output. In the early twentieth century, cash crops became much more important, with the Mekong Delta specialising in rice and foodstuff. The Southern field of Vietnam is situated in the low-lying land of the Mekong Delta (Mekong river basin), limited exposure to natural calamities such as tropical cyclones and floods.

The *field Mekong delta* * is the biggest significant granary of Vietnam; annually this region has contributed a great volume of rice and agricultural produce in consumer goods services and exports.

The population of this region is nearly 20 millions, it has 3,9 million hectares of natural land including 2,5 millions hectares of cultivated land, *specialty flood prone areas occupied over 1,8 millions hectares with about 10 million populations, and nearly 2 million short-lived houses.*

* Delta Mekong consists of 12 province



Since 1911, there was a great flood every 7 years but recently there has been more frequent floods causing population life and their property havoc to in this region. In 1996, the prolonged floods had taken a toll of a thousand lives and damaged infrastructures which was thousand billions of VietnamDong¹ worth. Therefore, resettlement and housing in Mekong delta is not only a most urgent requirement, but also a permanent task.

Some provinces of this region had been chosen for implementing an experiment, there are: *Long An, Tien Giang, Dong Thap, An Giang and Kien Giang*.

This paper introduces the investigation on construction of cluster population of flooding area, situated in **Angiang** Province, **Tinhbien** District, **Nhonhung** Commune² of Vietnam.

Angiang province has total natural land area of about 3424.3km², gross output is about 2044.6 thousand metric ton. This project is being taken by government budget and implemented by local authority.

The population of this region are living in rural areas, far away from, neighbourhoods, villages, towns, communities and city areas.

Objective

The target of this project is basically doing investigation on construction of clusters for the inhabitants of deep flooding area of Angiang province³.

It proposes modern settlement for the population, the technical solutions in laying the foundation of constructing housing, the technical means for solving the infrastructure system, constructing according to natural condition and socio-economic conditions at this commune sector.

It also calculating the demands of investigate funds, promoting the investigated items, administration measures for mobilizing funds resource to investigate, construct getting effect of cluster population before flooding season, should be undertaken.

This cluster population is about 214 households equivalent to 1075 people.

Area of land occupied is about 120.000 m² (including constructs province route of land), has connected with others district by province road.

The Site

Nhonhung Commune is situated in the northwest of the *Tinhbien* district in *Angiang* province along Campuchia border, located approximate 200 kms from the Ho Chi Minh City. Its resource is mainly based on agriculture, which is being annually flooded. Therefore, *Nhonhung* commune is still poor in the *Tinhbien* district

In 1996, its flood season, *all over Nhonhung* commune deeps in water 484 of a total 744 household (2594 population in 3786 the total number of inhabitants, one village infirmary, one school, have a poor crop in 95 hectares, 85-90 percentage agricultural land had been flooding in six months influenced for the populations who are living on there, many difficulties coming up^{3a}.

Otherwise *Nhonhung* has an important allocation for national securities. Therefore the cluster population constructions is basically significant for social-economic on one side, otherwise is still greatly significant in defending along border.

1 1 US\$ = 14.000 Vietnam Dong

2 *Nhonhung* commune is a place which this paper considers

3 Flooding depth (2-4 m)

3a That's mean the whole of commune, the site of project is a part of *Nhonhung* commune.

Statistics

Table 1

Aug		Sep		Nov		Nov		Dec		Add
High (cm)	Low (cm)	High (cm)	Low (cm)	High (cm)	Low (cm)	High (cm)	Low (cm)	High (cm)	Low (cm)	%
281	272	383	369	439	421	355	323	223	195	±10%
204	173	280	263	337	322	260	238	176	127	±75%

Table 2

No	Gauge station	Highest water level 1978, 5% add
1	Chaudoc	4.50 m
2	Tanchau ⁴	4.94 m

Tables 1 and 2: The Hydrograph and flooded situation 1978

The Climate of Vietnam is rather different, moist sub-tropical in the north having four seasons spring, summer, fall, and winter, and warm moist tropical in the south having two seasons: rain and dry. The rain season also means flooding season.

Strategies

Government Strategies

Generally, the rural planning and housing construction projects are under the administration of construction Ministry and based on government-sponsored schemes and implemented by local authorities.

Housing In Mekong Delta has to gain the demands:

- ❖ Carrying out basic survey on the housing development
Stating quantity and classifying house in remote areas, and unplanted area to work out a housing development plan suitable to the actual demands
- ❖ Creating an effective capital mobilization mechanism through inserting the projects developing traffic, hydraulic works, houses and infrastructure
- ❖ The form of BOT and BT⁵ may be applicable to the projects of water and electricity supplies. Models of residential centres should be multiplied on the whole of Mekong Delta.
- ❖ In the conference, Architect Nguyen Tan Van – Deputy Minister of Construction stressed: To help Mekong Delta taking off, the housing Planners should try their best for not only their responsibilities, but also their Love to the land and people of Mekong Delta

Local authorities choose the site, although they have a political priority in selecting the site but the professional had consulted them.

Local authorities have programmes to process the project with the guidelines “*State and people realise together*” and also stimulate rural people to improve their housing based on self-help policy having support of the State.

Supporting the peoples in resettlement to new area by loan with lowest interest and having relevant policy in land reputation.

(1996–2010) Planning strategies

General planning of the economy and social development in Delta Mekong (1996–2010) set up a main task: over ninety per cent of population have solid houses and semi-solid houses. That means every year, 200.000 houses must be built. But at present, construction speed just reaches unobtrusive result 1200 houses a year. By

⁴ **Tanchau** and **Chau doc** are district in Angiang province

⁵ BOT: Build Operate Transfer

BT : Build Transfer: Means a document in writing signed by investor and a competent body of the state for the construction of infrastructure projects in large-scale or small-scale as this paper then they will be exploiting in 20–30 years depended on the contract.

nearly six per cent of population in Mekong Delta. So that is an urgent matter for capital for housing, the planning of population in Mekong Delta is very complicated.

Achieving good result in planning will hasten the housing construction process for farmer in Mekong Delta and the investment of construction capital will be concentrated, and also this project is being of (1996–2010) planning.

The particular trait of flood-stricken area in Mekong Delta is people dispersing widely along river or canal and traffic system. This is a manner, which fit their living and producing. For this reason, planning task for new clusters and lines of population must be based on arranging the existing population areas. Plans have to present clearly the strategy of water supply, infrastructure and society. This will be legal basis for effectuating the rights of people in Mekong Delta.

Design Strategies

According to planners, population in Mekong Delta should be planned two solutions: Line of population and cluster of population.

- **Line of population:** arranging population along river or canal and traffic system. To the canal, which is favourable to drainage direction, population are arranged into two lines along the edges.

Roadside must be expanded to guarantee for living. This solution fits manner, living and producing of Southern farmer. But it's very difficult in using infrastructure construction and society. So this solution will apply in existing settlement. That solution has been formed long time.

Nhonhung commune will be designing in cluster solution.

- **Cluster of population** is often planned for every 200 household at least. (Each household occupies average about 120–150 square meter). In this project have three kinds of plot sizes: (4×16 m), (8×25 m), (10×25 m)

Towns and townships can be diked and filled up for flood avoidance. With residential areas, which are over 1075 people, filling solution is often used to place the centre of administration, health service, culture, park, and education. etc. Areas, which flooded over 4 meters under water, shouldn't be planned for living.

The cluster of population Nhon Hung commune was invested over twelve billion of Vietnam Dong to dig and fill land up 120.000 square meters, fill up 3.5 meter site level (because the existing geography is from 1.5 to over 2 meter). This level passes the flood peak 0.5 meters.

Infrastructure is rather completely and synchronous. It consists: a stoned road (591 meter long, 5 meter wide), water factory, electric system and water drainage system, markets (7580 m²), school (1500 m²), park (600 m²).

Water supply station and there are an electrical wire of step-down transformer that leaded to the cluster both of them was basing on population living demand. All are finishing for using early.

The Strategies of the Experimental Project

Requirement

The populations will get adequate dwelling during flood season, neighbourhoods, society relationships, safeties, communication, infrastructure system, health, producibility, living environment, and population living custom.etc.

Instruction

To implement the instructions of State, also the strategies in development rural of flood areas of Angiang province are experimentally constructed, with experiences for constructing others places in this province so far the region.

Forecasting population to 2010

In 1997, Nhonhung commune population was 3786 (744 household); the average rate of increase population as 1,8%, so population forecast in 2001 year is about 4060 (812 household), in 2010 year it will be about 4500 (900 household).

Distributing population

Population distributing on system in the commune must respond to produce distribution all over the commune and warrant stability for long term, so based on the requirement above in 2010 the commune wills need about 58,20 hectares of dwelling land (average 150m² per one person,)

Optimisation of use of land

This is really a difficult problem to solve, because the project has been planned, each square metre is carefully calculated, the formula must be strictly implemented but land property belongs to population ability, so the population has its own speculation in future. This problem has been still debating, caused the project is not finished up to now.

Conservation of living environment

This is cultural ecology of population who were living along the Mekong river, canal, even though along the arroyos so that settlement must be warranted that the populations are still keeping their living habit in natural environment, if the commune is not meeting the demands above, the project will be late in its implementation because it is not attractive for the population.

Provision of appropriate traffic road system

Up to now the populations are still using the canal or river for their transport, so the traffic roads system is also corresponding with river transport network, basically it has affected the architectural scene of rural housing and it has a significance in expanding the commune in future.

Provision of water supply, electricity and drainage

Even though this is a commune project but the society is developing, the population wants to catch up, so they need to fulfil their living condition more and more, this project must respond to this requirement, using national electrical network, exploiting the underground water resources as it is a foundation of improvement social living.

Provision of adequate public facilities

This experimental project considers the public facilities like market, school, health centre, meeting hall for community gathering. It must be provided in future because the population will increase.

Employment

This is a mainly government strategy because during flood season the farmers have nothing to do. They will get more work in the commune like electrician, plumber, carpenter, mason etc. also the commercial activities. The farmer can use their subsidies or micro-loan from government policy, local policy to start their small business so their living could be improved.

State management

In controlling and managing of State strategies, from the local authority to the state will control the annual increase of population, economic growth rate and specially controlling zone security and also population and public property.

Actors

The main actors are as follows:

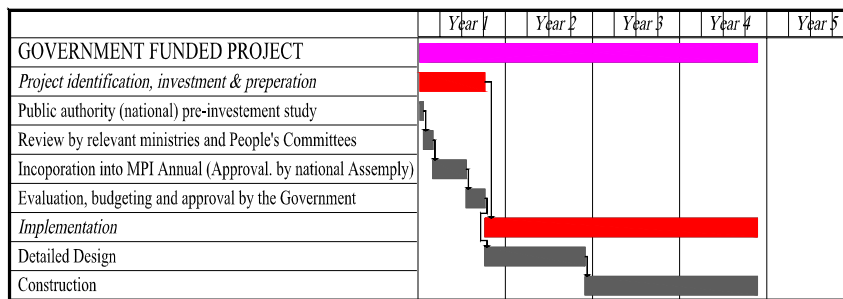
- Client (Investor)
 - Government
 - Local Authority
- Technical Department
- Function organization of project management
- Planner & Designer
- Consultant
- Contractors
- Banks
- Private sector
- User

Client (Investor)

With national projects, client is national business (General corporation, company), civil service, political organization, political-social organization or project

management organization (Competent level of government entrust them with direct management and using investment capital).

- In this project, the central government as a client including Ministry of Construction, its role is very important in managing and using the governmental budget, and also monitoring in term of project implementing. They haven't an active role but have a crucial influence on the beginning of project.
- Angiang's Local Authority was given that budget to implement the project. So the role of central government is controlling the budget source and regulating its use according to their schedule and reports from local authority. They have a financial capacity, which have been contributing to the project at least 40% financing. They have a biggest active role during project implementing. The local Authority is also a client but they will choose one of these department implements this project and their role as supervisor for government. The construction department⁶ of Angiang's province was chosen to implements.
- The construction department's role has a crucial task in making decision and coordinating with the rest of department in Angiang province to implement this project, but



(MPI: Ministry of planning and Investment)

Figure 01: Structural working schedule of project

Technical Departments

From many different angles, province's department is the most important partner. However, they are often forgotten. They are the one who have to run and maintain the building. Though an organization can act not only the client but also the building user, but the organizations takes in part may be different for instance: The Planning Department and the others in which concerned of Construction of Ministry could be defined that how many commune centres they have to build, where should its be, and how about their budgets, but all of outline above may be in the same objective but its are not indispensable take in part of making any decision in beginning, also The Planning Department and the others are not indispensable after that take in part and have not undertake a reasonability when some of demanded objective were not finished (F.e water supply) while the principal activities which mentions above has a significant matter of life and death for the living 's user. So that they have to gain the same point of view in province's agreement, they should be an active collaboration with construction department.

Function Organization of Project Management

Each construction building has to be finished to meet fully the legally regulation requirement which has involvement with standards and safety rate, it's also a reasonability of project warranty according to demands of the government organization which has a management and approval right like: The Ministries, local authorities has a "investment decision right."

To combine the roles of participants in construction project, its needs to be formed administive project and has a Board of project manager. In this project, Board of Project Manager will manage the construction project and has a

⁶ In Vietnam, each province has a Construction Department which has a right to provides the legally property, juridical and also they are presents of state.

responsibility of the whole project management activities with construction department (Investor)

Normally, thorough the tender, the client needs to select and sign a contract with a strongly consultant organization for executing their project manager function and giving a judicial norms. But in this project, Board of project manager usually selects the province's companies, which has not enough capacity so that the project was stretched out up to now that haven't finished.

Consultant

Basically, the consultant has an important role in coordinating between designers and constructor and also monitoring both of them during implementing the project. They are responsible in reporting to their client

They also review and assess data, check design codes and standard, identifying any further information and data required to carry out a comprehensive evaluation and assessment of the options for each of project components. For each component, review an assess available data from the component construction company (constructor) to determine the suitability of proposed component (constructor, designer, client demands), making alternative suggestion where appropriate.

In this project, they are also presented for client; they have an approval right when designers or constructor submit their objectives.

Designers

They are the architects, the civil engineers, the professional has their responsibilities to transfer the targets, the demands of client (Investor) to become actual. In this construction project, the architects has the first of role level but they have to combined with the participants like:

The civil engineer in making decision, calculating and designing the structural system of building, the electrical engineer in designing the electrical net system and calculating the demands of users, the technical engineer in road designing water supply, sewerage.etc and he estimator in calculating the quantities and building cost.

The big and complicated project like this paper mentioning could be demanded more professional or experts for instant environment, climate professional who could forecast the result in future. In site working the designer has an interpreter work follow the real site between consultant and constructor, then they will coordinate what's misunderstand, review and assess existing data.etc, in some case they are affected by others.

Contractors

It is an organization in which are undertaken to build the matter entities of building. In many case, they may be a governmental companies, private construction companies or incorporation Construction Company. In Vietnam, there are many ministries in which have their own construction companies. For Simply recognize the terminology "Contractor" are generally using and thoroughly to points the organizations really has a construction capacity and received the contrast by tender competition.

Sometime, The clients orders the special items of equipment directly to provider, for instant the equipment of health services for hospital, furniture, instrument teaching for school, this items is very important for finishing project also building self. Consequently the providers are to be contractor of project and have to be managed by project management.

- Contract with Board of project manager
- Collaboration with designers, consultant, private sector and the Nhonhung commune.

Private Sector

This project is a small-scale experiment project but the government really stimulates the private company take in part. This is a government policy, they wants to rapidly build the commune because the government budget has a limit. In facts it's active

policy. The role of private sector is motive force of social development in market economic.

They could be sub-constructor or provider the materials although more private companies participates in one of infrastructure project and sharing their activities. The administrative has a right policy for private sector or instance the administrative will gains and signs BOT or BT contract with private sector.

In this project, the private sector are considered as sub-contractor also monitored by construction management (main contractor)

Banks

The bank is belonged to local organization that received the budget from government and local organization. During implementing project, they has a partner in which will surveys and researches the land's market price, economic growth of commune after that they will proposes:

- The rate of loan on the user's land value
- Interest rate for long term (f.e: 10, 15,20 years.)
- Providing the subsidies to priority user

In real situation, some of user can not builds their house after received the loan and the land's reputation because the value of land increasing that caused the considerable success of this project.

Users

They are an important factor in formulating the cluster and they have an advantage, relevant policy of local authority if the project located on their old land because the location of this project had been lying on 8 hectares cultivated land.

In reality, the most of them are expecting the safety place, sense of community, thus for their new generation, so they have to be active participants, incorporation reputation and resettlement with board of project manager, but the most of them haven't ability in building their house so that they becomes *passive participations*. That problem is a seriously task of local authority during project proceeding, that is a curtail obstacle between local authority and user.

In a real situation, the people council is their presentation to solve the their problems, aspiration, demand between them and board of project manager.

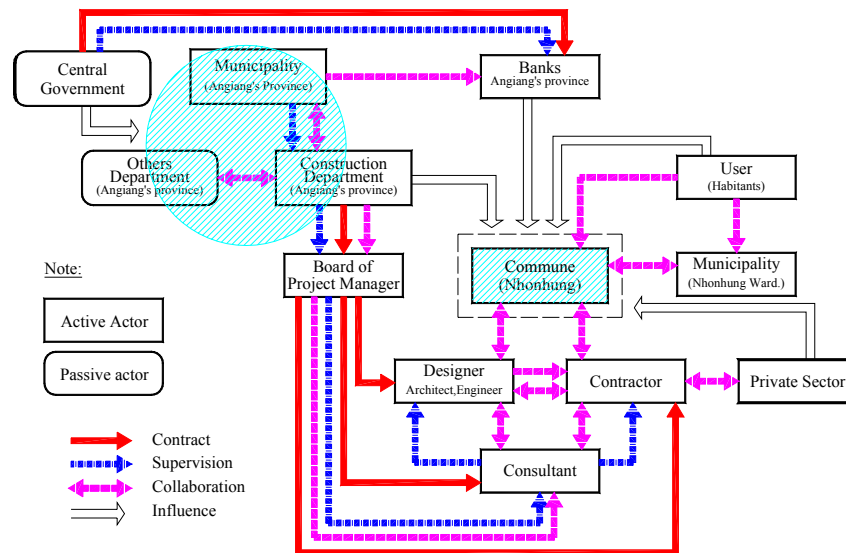


Figure 02: Structural working of project.

Design



The principal solution in this project was mainly filled land in area that had been chosen in which a natural geography were from 1.5 to 2 m. The dyke solution was chosen for bordering this cluster. The dyke were built over 0.3 to 0.5 m of peak of water level which had been gauged as highest water level in 1978 (water level 5m).

Master Plan Design

In the master plan, this project has been divided into two parts, each part has its own functioning like: public housing area was located in the centre of this cluster and private housing area was located on the rest of this cluster. Both of them were lying on area that has about 120.000 m².

Public housing area aimed to providing services like market, primary school, park, water factory, meeting place, sport place, cluster town.etc and also it has a provision of land for expansion in future. The infrastructure in this part was built like water network, electrical network, sewage system, and road system. Taken advantage on dyke surface for using as road to province road with 5 m width.

Private housing area aimed to provide for the population or the household in resettlement. Bases on that mater plan, the user will be given the legislation by local authority. There are three-plot solutions for this cluster: (4×16 m), (8×25 m) and (10×25 m).

It is belonged to user's ability; they can select what are demands of their living. In plot size (4×15m)=60m²; the housing concept is not meant as rural housing but it seem to be urban housing, the most housing at center's cluster prefer to have a limitation like that so far in this region or all over of Vietnam, because the land is to be increasing value. The houses in that part could be building 100% of plot size, including the second floor, in some case the authority allowed the user expanding to third floor. 40-50 % of ground floor they used for commercial activities stored the goods. In this case, the architects have been interested, because architects variously give the house types. But in many cases they are still belonged to user.

In real situation, only parts have a potential for recovering the loan of bank or government so that the cost of plot were very high (from 30 to 40 million VND).

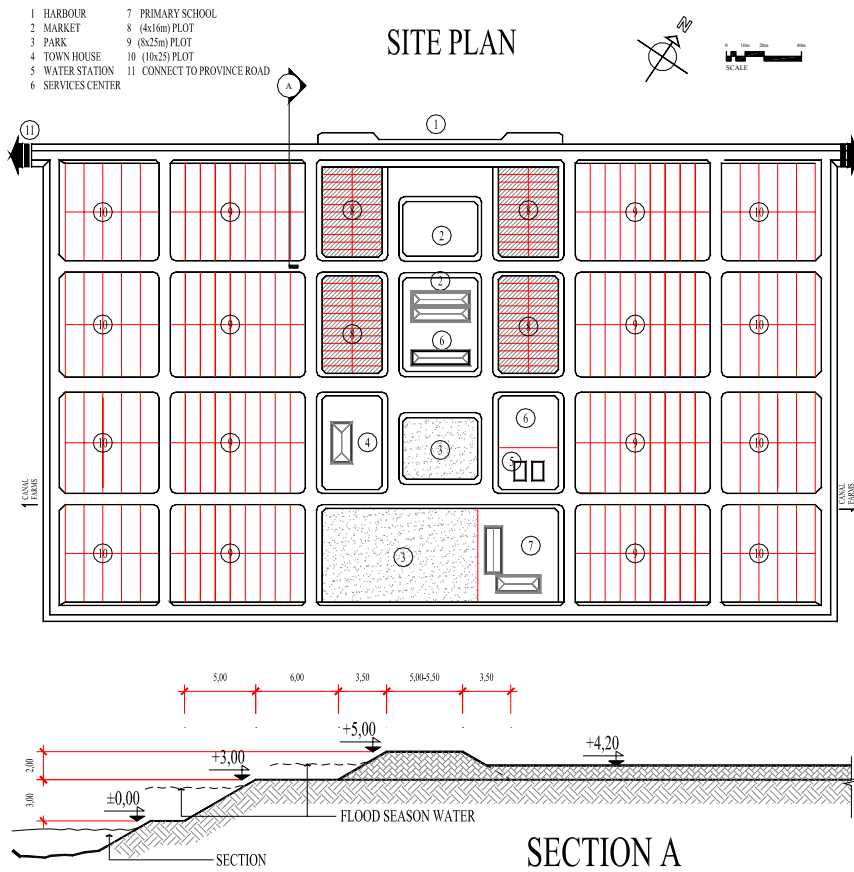


Figure 03: Master plan of project

In plot size $(8 \times 25m) = 200m^2$ and $(10 \times 30m) = 300m^2$, the housing concept is meant as rural housing in which were allowed building 50% maximum of plot size and the rest will be reserved for others element of houses like: plant area, lake, breeding farm, well-water.etc, the farmers are still keeping their environment living as much as possible in that plot size.

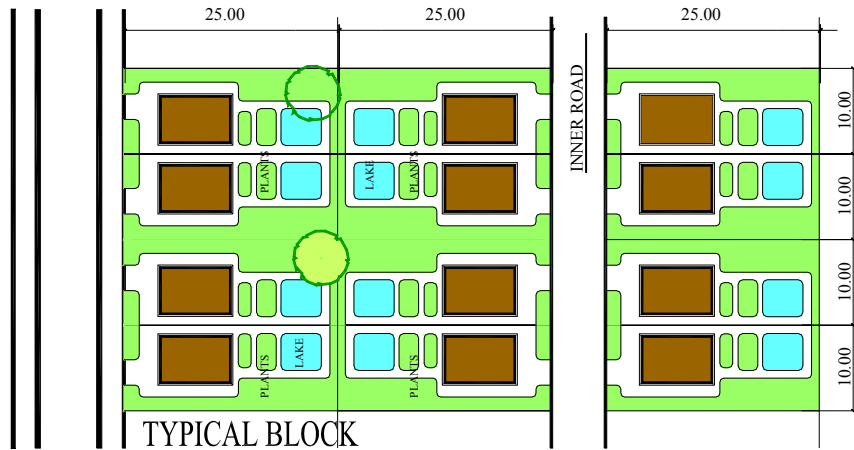


Figure 04: The layout of block

Infrastructure Design

In reality of site, all these infrastructure design based on master plan design, generally based on inner road network. The whole of these (water, electricity supply and sewage system) have to guarantee follow the *Vietnam standard (TCVN)*, this is a guideline for designer but in this project has some differences are allowed because it based on financing and knowledge of designer in flood area.

Landscaping and Leveling Design

This is really important for designing of project, because most of infrastructure design will be based on landscaping and leveling design, accordance with province road was carrying out with +5 meter level (this level is over Flood level 1996), average fill land level in this cluster is about 3,3m because existing level is about 1,5 to 2 meters and slope dyke is 1:1,5–2m

Sewerage System

In improving environment, sewerage system for cluster was mostly considered because it will be affected to cluster if it hasn't got a good design. So sewerage system is a ditch, covered by concrete slab and located aligning road system to collect the rainwater on street or wastewater of building. The ditch designed with short lines for quickly escaping the water. On every its lines arranged the manhole to withdraw the water.

Water Supply

Based on water consumption standard 70 liter/person/day
 The water station was arranged in central cluster with 100m³/day capacity and working 4-6 hours everyday, so each household have to build the water tank.

Electricity

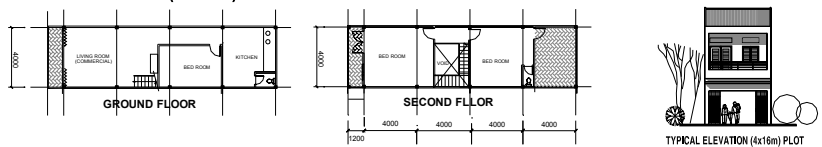
Based on electrical consumption standard 200/Kwh/person/year
 There are two hang electric stations arranged nearby water station to provide both side of this cluster.

Dwelling Design

House designs in this case have been designed and proposed by designer, also this paper would not going to particular details but the critical designing was strictly considered as the shape of house, living room, bed room and kitchen. In (4×16 m) plot, the patio of house was dominated because the adjacent building could be built higher, so adding the patio in house is very important for getting ventilation and sun light, both of them have not a least affecting to health care. In the toilet, the user have to build the septic tank, this is a regulation of local authority because the cluster has a sewage system, it will be polluted if there are not septic tank.

In bigger plot (8×25 m) or (10×30) plan will be proposed by designer because the use can build their house themselves in regulation of local authority. In the case, the septic tank is not very considered, but the absorption tank could be applicable.

TYPICAL HOUSE (4x16m) & PLOT



TYPICAL GADEN HOUSE HOUSE (8x25m) &(10x25m) PLOT

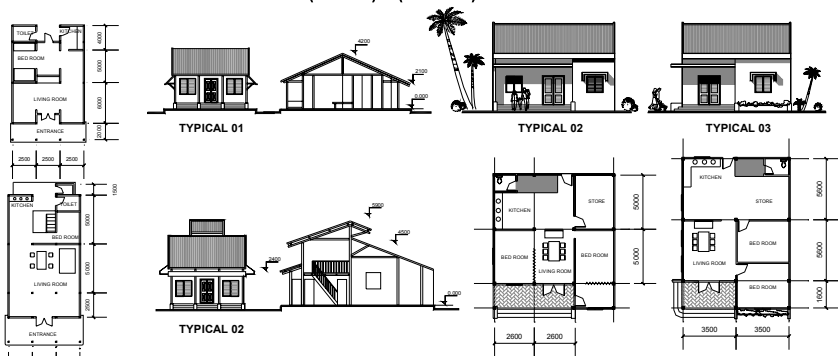


Figure 05: The style of house

Conclusions

This paper suggest specific actions to address the problem in resettlement of project, it is a essential to establish as soon as possible a policy that concerning housing and living condition which are appropriated for the dynamic situation thus in Mekong Delta. In this project, central government finances 40% for surveying, designing and constructing the main services and infrastructure, the local community contribute and support central government project by constructing other secondary networks. Central government also provides small loan for families who want to improve their housing condition but that loan is insufficient for any major work and thus monitoring is required for the given loan. So the way of using resources become more efficient and cost recovery improves, the government should provide to low income peoples access long term financing. They could guarantee the basis interest or giving subsidy to interest to enable the bank to provide long term financing.

The housing policy should be integrated and linked with policies of reducing poverty, promote education and health, provide the sanitation facilities, create jobs, environment protection, also very important in preserving cultural heritage.

The private sector should be mobilised to contribute their resources in producing and providing housing for resettling the peoples to the commune. They will face with market driven forces. Local authority should encourage the private companies because based on the all the economic, social and other existing condition State, the government companies have some priority like taxation business and more financing and supported by government agencies than other private companies. Otherwise private companies are not willing improve housing for poor peoples because of low profit.

The User's property should be clearly defined by legal rules and rights, because they have to get their own land, so the cost of land should be fixed with periodic revision to avoid land speculation.

The key word to improve living conditions actively is to know the need of different people. Nowadays, the farmers not only do the farming work but also do some more beneficial business. The needs for indoor space and outdoors spaces has changed considerably from the traditional pattern. As more and more modern equipment and appliance come into ordinary rural families, for example, small farming instrument with wheel, television, refrigerator, environment is also varies essentially. So user should have an *active role* to provide themselves and improve their housing with the mutual help with public, private sector, community, their participation could be from decision making to planning and carry out the *self-help housing method* which is the best way for them to provide housing to their family.

Finally, in improving housing condition women and children will be most benefited, they spend more time at home, women have more time from household work to take care of the children and improve their knowledge or education. Women will have more commercial activities, they will earn more money and their living could be improving step by step.

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