

# MECHANISM AND POLICY TO SUPPORT THE INSTALLATION OF LOW-COST EQUIPMENT ON WATER STORAGE, TREATMENT AND SUPPLY FOR RURAL DOMESTIC WATER FOR SMALL HOUSEHOLD AND RESIDENTIAL CLUSTERS IN THE COASTAL PROVINCES OF THE MEKONG DELTA

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**Abstract:** *Ensuring domestic water sources for thousands of households in the Mekong Delta is one of the urgent needs. There are many people in coastal areas still have to directly use the canal water and underground water of poor quality for daily activities, especially during periods of drought, water shortage and salinity intrusion. There are a number of domestic water treatment technologies are products of scientific research that basically meet criteria such as investment cost, low operating costs, easy management, and simple maintenance. However, for those technologies to be put into practice, suitable for the living, economic and social conditions of the coastal provinces in Mekong delta and capable of being replicated, it is necessary to have specific mechanisms and policies. Based on a review of existing mechanisms and policies, this article has analyzed and proposed a number of policies to support the construction and installation of rain and surface water collection, storage and treatment equipment to proactively supply water for rural households and small residential clusters during periods of drought, water shortage, and salinity intrusion in the coastal provinces of the Mekong Delta.*

**Keywords:** *Domestic water policies, rural domestic water, household, residential clusters.*

The Mekong Delta (MRD) is a low-lying area, bordering the sea, so it is strongly influenced by tides, and in the dry season months, salt water penetrates deep inland. Salinity intrusion affects drinking water supply, especially in rural areas without centralized water supply systems [1]. In addition, the increase in water use by countries upstream of the Mekong River has reduced freshwater resources here in both quantity and quality [2].

For thousands of households in 8 coastal provinces of the Mekong Delta, namely Long An, Tien Giang, Ben Tre, Tra Vinh, Soc Trang,

Bac Lieu, Ca Mau, and Kien Giang, the need for clean water for domestic use is the most urgent need. Because, many people in this area still have to live in a lack of clean water, directly using underground water sources of poor quality for daily activities. According to the results of the Rural Clean Water Monitoring and Evaluation Index of 08 provinces in 2020 [3], the rate of households using hygienic water is 92.74%, of which the rate of rural households using hygienic water from rural water supply works is 52%.

Most of the current operating status of water

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supply projects is concentrated in 8 coastal provinces in the Mekong Delta region is sustainable. But it is difficult to make accurate statistics and evaluate the effectiveness and sustainability of water supply projects for households and small household clusters in these provinces.

In fact, many household water treatment plants are ineffective or have stopped operating due to the following reasons:

- Pumping and water storage equipment is not maintained or changed regularly, leading to sediment build-up and unsanitary conditions.
- Water quality is not regularly checked according to instructions for maintenance of water treatment equipment and facilities.

Many sample technologies for domestic water treatment are products of scientific research projects that have basically met criteria such as investment cost, low operating costs, easy management and simple maintenance. However, for those technologies to be put into practice, suitable for the living, economic and social conditions in the coastal provinces of the Mekong Delta and capable of being replicated, it is necessary to have specific mechanisms and policies.

## 1. CURRENT STATUS OF EXPLOITATION AND USE OF RAINWATER AND SURFACE WATER FOR RURAL WATER SUPPLY

Household-scale water supply works are understood as domestic water supply works within households and groups of households such as dug wells, small diameter drilled wells, jars, water tanks, and natural water supply works with simple water treatment technology and other forms of water storage.

Domestic water supply sources for rural people in coastal provinces in the Mekong Delta include 04 main water supply sources:

*First*, centralized water supply works: coastal

provinces in the Mekong Delta region all have many centralized water supply works. Medium-scale water supply works (10-30 m<sup>3</sup>/h) also exist in most provinces but account for a small proportion, popular in Vinh Long, Dong Thap, Can Tho, Soc Trang, Bac Lieu, and Ca Mau. There are very few large-scale water supply works (>30m<sup>3</sup>/h), concentrated mainly in Ben Tre, Vinh Long and An Giang.

*Second*, household surface water: applicable to households living near rivers/canals, where surface water is not salty, far from centralized water supply stations, without underground water sources or underground water sources that are difficult to exploit. This form accounts for about 4% of rural water supply. Household surface water is commonly used in Vinh Long, Dong Thap, Hau Giang and An Giang provinces. The water source is taken and pre-treated with alum, without disinfection, so the quality is not hygienic.

*Third*, from drilled wells and small dug wells (household water supply): with household drilled wells, in areas with good water sources, the construction is simple and low cost, only needing to drill to a depth of 70- 150m is enough water to use and this is a form of rural water supply for households living in remote areas far from centralized water supply works. The drilling of wells for use is spontaneous and does not follow well planning, the construction methods based on experience. A small number of households use ponds to store water from the rainy season for gradual use in the dry season.

*Fourth*, from rainwater sources: The Mekong Delta is a region with quite a lot of rainfall, this is the main source for coastal areas, remote and isolated areas with salty, alum contaminated surface water sources, far from water supply works such as Ca Mau, Ben Tre, Tra Vinh...[1] Water collection works of rural people are traditionally made of built tanks, jars, etc. lined up under the eaves to use for drinking purposes.



*Figure 1 : People in coastal provinces of the Mekong Delta lack drinking water during the period of saltwater intrusion in 2019-2020*

Source: Nhan Dan Newspaper

## 2. CURRENT STATUS OF SUPPORT MECHANISM AND POLICIES

### 2.1. Current status, policy mechanism

Currently, there is no separate law for rural water supply activities, and is governed by other relevant laws, specifically:

- Law on Construction No. 50/2014/QH13;
- Law on Environmental protection No. 55/2014/QH13;
- Law on Water Resources No. 17/2012/QH13;
- Law on Food safety No. 59/2010/QH12;
- Law on Enterprise No. 68/2014/QH13;
- Law on Price No. 11/2012/QH13.

Under the current laws, there are 6 Decrees, 13 Decisions of the Prime Minister, 11 Circulars, 01 domestic water supply design standard, 02 regulations and 06 technology design standards, 02 regulations on clean water quality, 02 regulations and 2 environmental standards.

In general, there are many systems of Laws and documents guiding the management of rural water supply activities, but they still lack uniformity and there is no specialized Law. Specific support regulations for target groups of households and clusters of small households are

unclear.

### 2.2. Review relevant support mechanisms and policies

Although there are no support regulations for groups of households and small residential clusters, but there are some related contents, specifically:

a) Review the mechanism to support investment in construction and installation

The policy objective is to encourage all socio-economic sectors to participate in investment, construction and management and operation of rural water supply works, expressed in a number of key points:

- Give localities the right to be proactive in allocating budget resources and using support capital from the central government and other organizations to encourage socialization of the rural water supply sector in localities (according to Decision No. 131/QD-TTg).
- Regulating the level of support for private enterprises investing in the construction of clean water projects for rural areas is to support 03 million VND/m<sup>3</sup>/day of capacity for new construction or 02 million VND/m<sup>3</sup>/day of capacity for upgrading and renovating clean water production stations; maximum 50% of main pipeline costs leading to residential areas with 10 households or more (according to Decree No. 57/2018/ND-CP).
- Households will be able to borrow, proactively choose and implement construction, management and operation of water supply and sanitation facilities suitable to the family's conditions based on the annual capital allocation from Social Policy Bank. From 2018, the loan level is 10 million VND/household/project (according to Decision No. 1205/QD-TTg).

b) Review management and operation mechanisms

The policies focus on three main aspects: organization and operation management model, project exploitation management and water quality. Subjects to receive support policies are public service units, state companies and commune People's Committees and the type is centralized water supply works.

### 2.3. Assess the replicability of low-cost water treatment technologies at household and household cluster scales

#### a) Conditions for applying technology

- Residential clusters do not have or do not have a hygienic source of drinking water.
- Areas with river and stream water sources ensuring sufficient supply for daily activities of residential clusters.

- Area with ground to build storage ponds and treatment stations.

- Have initial investment funding, funding for operation, maintenance, replacement of materials and periodic monitoring costs.

#### b) Ability to replicate the model

To have a basis for developing policies to encourage households and residential clusters to be willing to invest in low-cost rainwater and surface water treatment technologies to ensure self-supply of hygienic domestic water during periods of drought and water shortage due to saltwater intrusion, this study conducted a survey of installation unit prices as of December 2022, specifically as Table 1.

**Table 1: Statistics on investment costs in integrated technology for treating rainwater and surface water at household and small residential cluster levels**

*Unit: dong*

| Content and equipment for integrated treatment of rainwater and surface water | Surface water - rain water of household | Surface water - rain water residential cluster |
|---|---|--|
| Actual water supply capacity  | 0,3 m <sup>3</sup>                      | 2,4 m <sup>3</sup> /day                        |
| Capacity to be processed  | 0,5 m <sup>3</sup>                      | 1 m <sup>3</sup> /hour                         |
| Electricity costs   | 540,00                                  | 225  |
| Quartz sand cost  | 64,81                                   | 111  |
| Replacement cost + adsorbent material   | 416,67                                  | 694  |
| Filter core PP  | 222,22                                  | 222  |
| Filter core 0.2   | 555,56                                  | 556  |
| Coal core   |   | 148  |
| UV light  | 200,00                                  | 200  |
| MF core   |   | 500  |
| Total amount of domestic water  | 1.799,26                                | 2.156  |
| Total amount of drinking water  | 1.999,26                                | 2.656  |
| Minor repair 5%   | 89,96                                   | 133  |
| <b>Cost of 1 m<sup>3</sup> of domestic water</b>                              | <b>1.889,22</b>                         | <b>2.289</b>                                   |
| <b>Cost of 1 m<sup>3</sup> drinking water</b>                                 | <b>2.089,22</b>                         | <b>2.789</b>                                   |

In general, the investment level is about 2 million VND for households and 2.5 million VND for small residential clusters [4] to meet the necessary living needs within the capacity

compared to the average income per capita in the Mekong Delta (50 million VND/person/year) [5].

In fact, rural water supply works run by

organizations such as public service units and private enterprises have all the cost items as prescribed in the calculation of price plans and necessary wastes to operate the works safely and ensure proper quality water supply. But works for households and small household clusters managed by the Commune People's Committee are small in scale, and most do not have adequate costs for materials, chemicals and other costs to support management, operation to ensure that water quality meets requirements.

Due to its small scale, it is difficult to organize an operating management unit with full apparatus and technical requirements. In particular, these projects are often not attractive to independent business organizations, but the models are mainly associated with the government and public apparatus to compensate for the economic limitations of the model and realize social stability goals.

### **3. PROPOSING SOME MECHANISM AND POLICIES**

#### **3.1. Support the exploitation of rainwater and surface water sources**

*First*, supplementing resolutions, strategies, laws, and credit loan programs (especially replication for provinces outside Tien Giang according to Decision 62/2004/QĐ-TTg of the Prime Minister government on credit to implement the National Strategy on clean water supply and rural environmental sanitation),... on expanding beneficiaries of policies to support the exploitation of rainwater and surface water resources for Rural water supply services outside households are household clusters (the Mekong Delta region has a scale of 3-5 households).

Second, build a mechanism (mandatory) to transfer a number of technical solutions to build fresh water tanks for use or treatment to serve daily needs during periods of drought and water shortage due to prolonged saltwater intrusion.

Third, build a legal framework and strengthen support policies for private investors who are encouraged to invest and also provide household cluster-scale treatment works and storage equipment to store rainwater and surface water (bottles, tanks, plastic bags,...).. In addition, there is the price of water supply services (fixed or mobile) and the level of state support for investors during times of drought - saltwater intrusion.

Fourth, prioritize policies to accelerate the implementation of a group of solutions to create on-site water storage sources through a system of irrigation works. Due to the characteristics of the water supply system of the coastal provinces of the Mekong Delta, which is mainly exploited from surface water sources, it is necessary to take advantage of canals, ditches, ponds, etc to store water during the rainy season and reuse it in the period of drought - saltwater intrusion.

*Fifth*, in addition to large, regional solutions such as building irrigation reservoirs, there needs to have documents and instructions from the government (provincial, district, commune, village/hamlet) to mobilize households and residential clusters proactively dredge water intakes and infield canal systems, build temporary dams to prevent salinity, store fresh water in the canal system, dig water storage ponds, install and operate field pumping stations to make the most of water resources from river systems, canals, reservoir dead capacity and inland water sources (note residues of pesticides on fields and farms).

On the other hand, local governments consider and approve contracts to operate and maintain water storage facilities and equipment according to the list of support to cope with drought and salinity to maintain funding and favorable business environment for investors.

*First*, there needs to have a strategy to develop clean water supply systems everywhere. There

is a solution to store water during the rainy season because this is an abundant source of clean water for daily use. Increase awareness of people, especially households affected by saltwater intrusion in the coastal provinces of the Mekong Delta in saving and using clean water properly; adjust production, avoid agricultural production that uses a lot of fresh water.

*Second*, support rural households to borrow preferential credit from the rural clean water and sanitation credit program to build, upgrade, and repair household-scale water supply works. Preferential loan levels comply with regulations of the rural clean water and sanitation credit program approved by competent authorities. Continue to propose state management agencies to submit to the Prime Minister to continue implementing the credit program for the rural clean water and environmental sanitation program (Amending and adjusting Decision 62/2004/QĐ-TTg or issue credit decisions in the coming period) in the direction of increasing the support level of 15 million VND/household/project and expanding lending subjects.

*Third*, provide financial support for the construction of household-scale water supply projects for poor, near-poor households, and policy families in rural areas.

*Fourth*, support funding to install household water treatment equipment for poor, near-poor, and policy families in rural areas who are using water from drilled wells, dug wells or other water supplies sources do not meet standards.

*Fifth*, for saline water treatment technology, currently the most popular is RO filtration technology. This technology consumes a lot of electrical energy and is difficult to access on a household scale or small residential cluster. On a large scale, there needs to be participation in technology transfer and O&M services for such equipment from the private sector. Therefore, if there is a suitable price mechanism and at the

same time applying technical measures to save electricity, water supply units or private enterprises can completely invest in saline water treatment technology.

*Sixth*, take advantage of the experience and resources of international organizations such as: WB, ADB, UNICEF, FAO, Australia, NGOs... in the fields of clean water and rural sanitation in a sustainable manner and respond to climate change and salinity intrusion, focusing more on target groups such as households and small residential clusters. Promote information sharing activities in the field of clean water and rural sanitation with other countries and international organizations to exchange management experience, inherit scientific achievements, apply and transfer technology, human resource training.

In particular, the level of support for the 2nd and 3rd content mentioned above is determined by the Provincial People's Committee according to its authority or submitted to the Provincial People's Council for decision depending on each object, in accordance with the ability to balance the budget local.

### **3.3. Special support for construction and installation of low-cost rainwater and surface water treatment equipment**

With the living habits of rural people in the coastal provinces of the Mekong Delta, the model of small residential clusters will have more conditions to jointly solve the problems of lack of domestic water during the period of drought - salinity intrusion. Basically, the demand for domestic water for small residential clusters will be larger than the household size and equal to or nearly equal to a centralized water treatment station for an agency or small medical facility.

Therefore, we propose some specific mechanisms and policies for this target group as follows:

- Management model: Self-managing teams or teams. Members of the groups/teams are members of beneficiary households or have 1 additional officer/employee with expertise in management, use, maintenance and operation in the community.

- In cases where the locality has a mobile team/team providing management, use, maintenance and operation services for domestic water supply works for residential clusters. Propose that the state and local authorities encourage units and organizations to manage and operate works according to the revenue compensation mechanism or cross-subsidy mechanism; Support and compensation such as labor costs, chemical supplies, etc for these groups/teams so that they can feel secure in managing rural water supply works at the scale of residential clusters.

- Strengthen the application of water price cross-subsidization policy between works located in areas with favorable conditions and works located in difficult areas to ensure profits for units and organizations that participate on operation management and maintenance of residential cluster-scale water supply works in a sustainable and stable manner. Improve financial autonomy, earn enough to cover expenses.

- Have a policy to create a source of support for water supply at the provincial level in terms of maintenance, repair, replacement and upgrading of water treatment equipment for small residential clusters in areas with water scarcity due to salinity intrusion and poor conditions. Supplementing the Mekong Delta region in Decree 32/2018/ND-CP and being specified by region, closely following the criteria of the size of households in a residential cluster and the ability to pay of water users to ensure that households use water according to allowed standards, especially supporting poor households that cannot afford to pay for water

where the poverty rate is high.

- Initially, it is necessary to consider applying policies to support capital costs and maintenance costs such as annual repairs for household clusters during times of drought or water shortage due to salinity intrusion. People can contribute funds through water connection, this cost will be gradually deducted through water usage fees or in the form of manual labor contributions for jobs that do not require technical skills such as digging, filling soil, dredging sludge, cleaning, creating ground, clearing land, protecting construction assets...

- There needs to have guidelines for developing contracts and revenue and expenditure mechanisms for works where the property manager is a residential cluster (with a household represented before the law) and a group/team (if have) assigned operations and maintenance tasks. This is the basis for these organizations to perform maximum work and promptly handle equipment damage during the operation of water supply works.

#### **3.4. Methods of organizing and implementing mechanisms and policies to implement support proposals**

Methods of funding support for construction and installation of low-cost household water treatment equipment for households and small residential clusters are proposed as follows:

*First*, based on the Decision to allocate support capital of the Provincial People's Committee, the District People's Committee on organizing the implementation of support and guiding households and residential clusters to choose models of household and public water supply works; water treatment technology and equipment for households and residential clusters.

*Second*, the district People's Committee presides and coordinates with relevant units to organize inspection and acceptance to support funding for installing water treatment

equipment for households according to regulations. Proposed through grassroots units at district and commune levels such as the Fatherland Front, Women's Union, Veterans Association,...

*Third*, credit institutions guide the order and procedures for lending preferential credit to households to build household-scale water supply works. If it is a residential cluster with 3-5 households, build a representative mechanism to complete legal procedures to receive economic support mechanisms. Strengthen support and create favorable conditions to access preferential credit capital for groups of households and small residential clusters.

In addition, to ensure small-scale water supply meets clean water supply standards, it is necessary to pay attention to propaganda, advocacy, and guidance for households to treat water, store water, and use water safely. In propaganda work, mobilizing people to continue promoting forms and habits of using surface water and storing rainwater but must be

treated before, use water economically and proactively store water before the beginning of the dry season.

#### 4. CONCLUSION

From the conducted research results and survey data, the article has reviewed and supported the construction and installation of low-cost rural domestic water collection, storage, treatment and supply equipment on a household scale and small residential clusters in coastal provinces of the Mekong Delta. In particular, focusing on the main issues are: (i) it is necessary to soon add households and small household clusters to the group of beneficiaries of support policies in current legal and document systems; (ii) evaluate and adjust Decision 62/2004/QĐ-TTg or issue a credit decision for the rural clean water and environmental sanitation program in the coming period; (iii) take advantage of the resources of international organizations: WB, ADB, UNICEF, Australia, NGOs... in the fields of clean water and rural sanitation in a sustainable manner and respond to drought, water shortage and salinity intrusion./.

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