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THE AWARENESS OF THE LOCAL AUTHORITIES ON CLIMATE CHANGE IN THE NORTH CENTRAL REGION OF VIETNAM

Abstract: Vietnam is considered one of the countries heavily affected by climate change. Therefore, the top priorities are managing natural disasters and implementing activities to respond to and adapt to climate change to reduce its negative impacts. The article focuses on studying the awareness of local authorities in some provinces in the North Central of Vietnam about the causes, severe effects of climate change, and the response measures. After that, the author makes some recommendations to raise awareness for officials in this region and Vietnam.

Keywords: Climate change, local authorities, and Vietnam.

1. Introduction

In the current administrative system in Vietnam, according to the Constitution in 2013, the government concludes four levels: central, provincial (city), district, and commune (ward). The commune-level is considered the grass-roots one directly related to the people's activities. Thus, this management team's qualifications, ability, and quality will bring the efficacy of the local

government's management operations, the accurate application of the legislation, the assurance of people's living and working environment, and legitimate interests. It can be said that the local government plays a vital role in responding to climate change and minimizing its adverse impacts on people's lives and production. Therefore, the local leaders need to research and capture knowledge about climate change because good awareness is the fundamental premise for the right action. This paper will give some solutions to overcome limitations and improve the understanding of this team. Thanks to that, they will make the right and appropriate decisions and actions to proactively solve this issue in the locality.

2. Research methods

The article is based on a research and field survey on awareness about climate change for 290 people who are local leaders. They are studying at political schools in Thanh Hoa, Nghe An, and Ha Tinh Province, aged 22 to 52 years old. Men account for 66.2%, and women are 33.8%. The content of the survey and identification is reflected in the following issues:

- Awareness of climate change.
- Awareness of the causes and effects of climate change.
- Awareness of measures to respond to climate change.

This study aims to clarify managers' awareness of local authorities in areas often heavily affected by climate change. Finally, some recommendations will be proposed to improve their knowledge and leadership capacity to respond to climate change.

3. Results and discussion

i, Awareness of climate change

Climate change is the changes in the climate over a long period (IPCC, 2011). According to the UNFCCC, climate change is a change of climate that, directly or indirectly, is caused by humans. It changes the composition of the atmosphere, besides natural climate change.

Climate change includes an increase or decrease in regional and local temperatures, changes in precipitation, and sea-level rise. (ISPONRE, DONRE, WWF, 2013b)

Dolan and Walker (2003) discussed the determinants of capacity to adapt to climate change, including accessibility, human understanding, wealth distribution, technology and information, risk perceptions and attitudes, social capital, and critical institutional frameworks to address risks of climate change.

Awareness of climate change is a process by which each person understands the nature, manifestations, causes, and consequences of climate change. It is also the progress of capturing and perfecting skills and solutions to respond to climate change, the urgency of responding to the guidelines and policies of the State, the provisions on prevention and mitigation of harmful effects of climate change, and sustainable development.

In recent years, the phrase “climate change” has appeared frequently in the mass media as well as in daily life, but it hasn’t been apprehended. The survey results show that although it is a relatively new definition implying the change of the climate system (including atmosphere, hydrosphere, biosphere, and lithosphere), three-quarters of the respondents are aware that this term is used to describe the change of all of the above systems. Only a quarter of respondents believe that climate change changes the atmospheric system.

It can be seen that communicating information on climate change in the media, conferences, and training sessions held in recent years has achieved good results. Many people were familiar with the concept of climate change, and the majority of respondents comprehended this term. However, a quarter of respondents are still confused between the two phrases “climate change” and “change in the atmospheric system.” It revealed that the understanding of officials at the localities was familiar with the issue of climate change and atmosphere. However, some people have not known that climate change is a general problem. It’s not only the atmospheric system but many other systems,

as closely related to life as the biosphere (genetic change or disappearance of some species of plants and animals, the reduction of forest area), or hydrosphere (change of water sources, drought, and flood.)

To learn more about the awareness of local officials on climate change, this research provided indicators to determine their level of understanding about some issues. Significantly, the contents have been confirmed in "the National Target Program (NTP) to respond to climate change" launched and implemented by the Vietnamese Government throughout the country in recent years. The eight-criteria survey results denoted an exciting fact: nearly half of the respondents agreed. In contrast, almost half of the remaining people had negative opinions on some fundamental indicators. The criteria: "Joining the international community's efforts to mitigate the effects of climate change and protect the global climate system" recorded the highest percentage, 80%. Another main content, "Effective and economical use of energy," was agreed by 75.4% of respondents (294 comments). It could be said that the above two contents achieved positive results thanks to the communication as well as the efforts of each individual in researching tasks. The fact that Vietnam signed a series of crucial documents on responding to climate change, such as the Kyoto Protocol and the Convention on Climate Change (CCC) adopted by the Conference of the Parties 21 (COP 21) in 2015 with international organizations and several countries had been widely publicized by the mass media. The action program of the Government, the relevant agencies, and organizations on energy saving, was powerfully deployed, having a positive influence on the respondents' perception. Similarly, afforestation and forest protection were interested in the Party and Government. A series of changes and supplements were issued in new Resolutions, Decrees, measures, and policies. For instance, the Prime Minister launched the "Annual Tree Planting Festival" and the "One Billion Trees Program" in early 2021. In addition, the benefits of forests as the "green lungs" of the Earth have been disseminated in various forms.

Furthermore, the management and direction of these activities in the locality have brought encouraging results. Over 73% of respondents agreed on this factor (see the table below).

Table 1: The National Target Program (NTP) to respond to climate change under respondents' opinions (%)

No.	*Contents in the Program*	*Agree*	*Disagree*
1	Identifying measures to use energy economically and efficiently.	75,4	24,6
2	Preparing scenarios to cope with sea-level rise.	43,1	56,9
3	Building a low-carbon economy.	23,6	76,4
4	Protecting people against the harmful effects of climate change.	59,5	40,5
5	Joining the international community's efforts to mitigate the effects of climate change and protect the global climate system	80	20
6	Preventing and reducing the risks caused by climate change.	71,3	28,7
7	Exploiting and protecting forests sustainably.	73,8	26,1
8	Preventing diseases related to climate change.	51,3	48,7

The results indicated that many problems needed to be solved in some other contents of The National Target Program (NTP) to respond to climate change. Regarding the factor "Building a low-carbon economy," only 23.6% of respondents agreed (92 votes). The local officials knew many issues about climate change. However, they didn't understand the contents of the Government's Program, especially those related to abstract and scientific problems that might be challenging for most staff with a moderate education level. This finding proved that this content might have been ignored or might not be provided adequately for them. The term "low-carbon economy" isn't used

much in life, making it difficult to understand if only briefly mentioned. Therefore, when implementing practical activities and communication at wards and communes, it is crucial to pay attention to the educational level of the recipients. We shall explain scientific terms for many people and limit technical and specialized terms. For example, instead of using the phrase "low-carbon economy," we should explain or use an equivalent phrase such as "low-pollution economy," as it will be easier to understand for the listener.

ii, Understanding the causes and effects of climate change

To better understand local officials' awareness of climate change, the study provided indicators to measure several specific issues such as causes and consequences of climate change. Fỏ the question: "What causes the Earth to get warmer?" 94.4% of the respondents answered that it was due to the "indiscriminate burning of forests and deforestation." Indeed, the burning of forests and deforestation are pretty common, especially in many developing countries, including Vietnam. These are the main reasons why greenhouse gases are not absorbed and increase the Earth's temperature. It could be stated that the local leaders had a deep understanding of the importance of "green lungs" in protecting the global climate.

Table 2: The understanding of causes of global warming (%)

No.	*Causes*	*Yes*	*No*
1.	Burning and destroying forests indiscriminately.	94,4	5,6
2.	Uncontrolled industrialization and urbanization.	76,4	23,6
3.	The population increased rapidly.	56,4	43,6
4.	The misuse of fossil fuels.	41	59
5.	Using motor vehicles that don't meet emission standards.	82,1	17,9
6.	Using outdated production technology.	43,6	56,4

7.	Changes in geothermal resources of the earth's tectonic plates.	50,3	49,7

According to Table 2, "using motor vehicles that don't meet emission standards" was considered one of the causes of global warming. The rate of affirmative opinions was relatively high, reaching 82.1%. As scientists have warned, the emissions of motor vehicles contribute to the increase in temperature in the air, and Vietnam is a country with a large density of motor vehicles (cars, motorbikes, etc.) The number of motorbikes is over 30 million units, and the number of motor vehicles climbs rapidly every year. Moreover, the control of emissions from vehicles hasn't been effectively implemented, making the atmosphere hotter and more polluted. In big cities, CO emitted from vehicles causing air pollution accounted for from 70% to 90%, in which motorcycles causing pollution hit over 90% compared to other vehicles.

The local management team had a reasonably good awareness of the harmful effects of indiscriminate burning of forests, deforestation, and greenhouse gas emissions. Therefore, it's vital to establish an effective control mechanism for appropriate resources (manpower and financial resources) to implement the forest protection strategy and reduce and control emissions from motor vehicles. The international community had made efforts to control emissions. The most favorable result was that countries had agreed to sign the United Nations Framework Convention on Climate Change at COP 21 in Paris in 2015. It has gone into effect globally to prevent the earth's temperature from rising more than 1°C by the end of this century.

The survey results were below average in other momentous causes related to climate change. Only 43.6% of people believed that the cause of climate change was due to "using outdated production technology." 41% of respondents confirmed that "misuse of fossil fuels" could lead to climate change. It could be said that fewer than half of the local officials comprehended the need to upgrade

and develop advanced and modern production technology, as well as restrict the use of polluting non-renewable energy sources. They directly lead the residential areas, so their influence is significant in keeping the green and clean environment in the wards, communes, and towns. Therefore, if there are no synchronous solutions to raise their awareness and sense of responsibility, it is challenging to improve using outdated production technology that consumes much energy and emits harmful gases into the environment. Some suggested solutions are: First, it is essential to promote communication about the economic and environmental benefits of using modern technology in production and life for officials and the people. In addition, the State and social organizations should provide supportive policies for business households to access new technologies (including introducing technology, subsiding to purchase supplies and production equipment, supporting capital for technological innovation and production processes.)

According to scientists, rapid population growth has led to over-exploitation of resources (including deforestation for arable land and exhaustive exploitation of non-renewable energy resources.) These factors contribute to global climate change. However, the survey revealed that the number of people who comprehended this issue was only above average (56.4%). The awareness level of half of the local officials about social problems related to climate change was limited. The reason was that this connection was indirect, requiring the ability to reason. On the other hand, the issue of rapid population growth seemed to be beyond their control. Moreover, some of them didn't comply with the Government's regulations on implementing population policy and family planning, especially in rural, remote, and isolated areas.

In general, most respondents had an above-average understanding of the causes of anthropogenic climate change. It was not only the achievement of the education and communication that all relevant agencies and organizations had

taken but also the local officials' efforts to improve their knowledge in recent years. However, positive measures are required more, raising their awareness.

Vietnam is a coastal country, so the long coastline makes it one of the countries at high risk of climate change. When researching the harmful effects of "sea-level rise and high tide" on people's daily lives and production, nearly 90% of the respondents said that sea-level rise and high tide made the land be "salinated and deserted." 84.6% of respondents confirmed that these phenomena would make "houses be destroyed." However, when asked about the adverse effects of these phenomena on other social issues, such as employment and biodiversity, which seemed unrelated to climate change, the respondents' level of awareness was quite limited. For example, 44% of the people stated that "sea-level rise and high tide reduce biodiversity." 36% of respondents said that "sea-level rise and high tide" caused a lack of jobs.

Table 3: Effects of climate change on the sea-level rise (%)

No.	*Negative effects*	*Yes*	*No*
1	Houses are destroyed.	84,6	15,4
2	Lack of food.	67,2	32,8
3	Soil is salinized and deserted.	89,2	10,8
4	A rise in diseases.	72,8	27,2
5	A reduction in biodiversity.	44,1	55,9
6	Serious environmental pollution.	76,9	23,1
7	Lack of jobs.	35,9	64,1
8	Freshwater is scarce.	79,5	20,5
9	It's difficult to control migration.	40,5	59,5

It's evident that to have the correct answers, participants need to be equipped with more extensive knowledge, especially that of social issues. From there, they can understand the indirect relation between climate change

phenomena and life as well as work. The percentage of affirmative opinions was low in contents containing technical terms, which were rarely mentioned, such as “a reduction in biodiversity.” In these cases, the education level of the respondents was momentous. For example, the proportion of opinions affirming the relationship between social issues (such as labor and employment) with climate change increased in people with high education levels and vice versa. Of 62 participants with high school education, 22 people (accounting for 35.5%) believed that climate change had terrible effects, reducing biodiversity. However, for those with undergraduate and graduate degrees, 166 people answered correctly (recording 42.6% of the total respondents). In which, 110 people (hitting 66.3%) understood the harmful effects of sea-level rise and high tide on biodiversity.

The sea-level rise and high tide directly and mainly affect coastal residential areas. In contrast, global warming affects all nations. It could be said that most officials were aware of the harmful effects that global warming caused on production and human activities. One of the most well-recognized consequences was “causing forest fires on a large scale,” with 84.6% agreement. 84.1% of people said that global warming led to the water shortage for daily life and production. And, 83.6% of participants supposed that climate change and global warming caused a “rise in diseases.” These figures showed a positive signal. However, the survey results had a downward trend for the factors measuring local managers’ perception of consequences that were difficult to observe directly. For the question “Will global warming increase the cost of medical care?” 39.5% of participants said “yes.” This demonstrates that many local officials haven’t had a profound and complete understanding of climate change’s consequences, indirect harms, and negative social impacts.

Local officials and organizations in charge of management need to know the vulnerable groups, which is an indispensable factor that mainly influences the response to climate change in the localities. The collected data revealed that

most of these officials understood this issue. Specifically, up to 87.2% of respondents said that the poor were "the most vulnerable group to the harms and impacts of climate change." Nearly 9% of people had no idea or said that "it's difficult for them to answer," and more than 4% of respondents believed that the vulnerable group was the rich (2.1%) and well-off people (2.1%).

iii, Awareness of measures to respond to climate change

In addition to finding out the awareness of local authorities on causes and consequences of climate change for people's lives, production, and activities, this research also focused on clarifying some issues related to their views on the necessity of preventing and responding to climate change. The study had proposed six contents to measure staff's awareness, and the results were as follows: (see the following table)

Table 4: Importance of responding to climate change in Vietnam nowadays (%)

No.	*Natural and social conditions*	*Agree*	*Disagree*
1.	Vietnam has a long coastline.	82,1	17,9
2.	Vietnam is a low-income country.	51,3	48,7
3.	The intellectual standard in Vietnam is low.	44,1	55,9
4.	Vietnam has a high population density.	48,7	51,3
5.	Vietnam is basically an agricultural-producing country.	75,9	24,1
6.	Vietnam hasn't established effective mechanisms and policies to respond to natural calamities.	47,7	52,3

The above data showed that most participants (82.1%) thought responding to climate change was indispensable because our country had "a long coastline." 75.9% of respondents said that "Vietnam is an agricultural-producing country." In general, the above statements match with the analysis and assessment of scientists when ranking Vietnam at the top of the countries and territories most

affected and at risk from climate change due to the above two reasons. It can be said that the natural geographical conditions and the dependence of agricultural production on weather fluctuations have made the response to climate change of our country more urgent than other countries and territories. Being well aware of the risks from climate change allows local managers to prepare effective plans, minimizing negative impacts on people and society. Other criteria, such as intellectual standard and population density, don't play a decisive role in responding to climate change in all countries.

To determine the appropriateness of response solutions in the context of limited resources, the research presented a 9-measure system. The survey results were as follows:

Table 5: Response solutions that need to be implemented in the context of limited resources (manpower and financial resources) (%)

No.	*Solutions*	*Agree*	*Disagree*
1.	Providing information and warning people about the harmful effects of heatwave and drought on production and human health, and precautions	81,5	18,5
2.	Communicating and educating eco-friendly lifestyle.	86,2	13,8
3.	Controling and minimizing greenhouse gas emissions of factories and production facilities.	71,8	28,2
4.	Raising taxes and fees for exploiting or using fossil energy.	32,8	67,2
5.	Doing well in forest protection and afforestation.	94,4	5,6
6.	Suspending the operation of production facilities that cause environmental pollution.	75,9	24,1

The solution "forest protection and afforestation" was chosen the most and accounted for the highest percentage, reaching 94.4%. It is the right choice

because responding to climate change requires short-term and long-term actions. Luckily, “protecting forests and planting new forests” both protect the ecological environment and develop sustainably.

“Communicating and educating eco-friendly lifestyle” and “providing information and warning the people about the harmful effects of heatwave and drought on production and human health, and precautions” were two solutions that received the support of the majority of respondents, recording 86.2% and 81.5%, respectively. They were considered possible solutions in the current status of provinces because they were easy to implement and inexpensive. Moreover, they promoted short-term and long-term efficiency.

Other solutions were fundamental and macro-level, so they were approximately the average percentage. Specifically, “applying advanced production technologies” to prevent and reduce environmental harm and climate change only recorded 55.4% of people accepted. “Transforming production structure” and “planning the construction of ecological residential areas” reached 47.2% and 42.6%, respectively. However, the most important question was why many officials didn’t consent to the radical and consistent solutions with sustainable development? The reason could be pretty simple. Solutions with high consensus were feasible and suitable for the current conditions of localities. Although other solutions were fundamental, they lacked practicality due to limitations and difficulties in many aspects. Furthermore, they were not under the decision-making authority of the local government, which made their percentage low.

The study raised the question “What should local authorities do to protect civilians from the harmful effects of high tide and sea-level rise?” to clarify the perception of local managers about selecting solutions and actions to respond to climate change. According to the findings, “planting forests to block sand and preventing salinity and coastal erosion” was the solution that was chosen most. The three following measures possessed the rate from highest to lowest.

“Building and strengthening river and sea dyke systems” reached 83.1%. “Establishing an early warning and information system” hit 81.5%. The last one, “relocating the local people from lowland and coastal areas,” recorded 72.3%. (See the table below)

Table 6: Response solutions

No.	*Response activities*	*Agree*	*Disagree*
1	Establishing an early warning and information	81,5	18,5
2	Relocating the people from lowland and coastal areas.	72,3	27,7
3	Planting forests to block sand and preventing salinity and coastal erosion.	89,7	10,3
4	Building and strengthening river and sea dyke	83,1	16,9
5	Actively providing fresh water for production and daily life.	63,6	36,4
6	Increasing the capacity to handle environmental pollution after natural disasters.	68,7	31,3

These statistics showed that most local leaders knew the measures prioritized for the poor provinces with the above geographical and ecological characteristics. The most vital thing was that choosing the right solutions in the context of limited resources would bring success for specific ones. It also proved that local-level managers had good cognitive capacity.

4. CONCLUSION AND RECOMMENDATIONS

4.1. Conclusion.

After analyzing and evaluating the survey data, it can be seen that most leaders at the local level possess a good understanding of climate change. They have answered many critical criteria related to climate change. Yet, there were few correct answers for some abstract contents.

As for the causes and effects of climate change, respondents were aware of the leading reasons as well as significant impacts on people's lives, production, and society. However, many people didn't know indirect causes and effects.

Officials at the local government had comprehended the importance of taking steps to mitigate the consequences of climate change. They had highly agreed on specific actions that were appropriate for the conditions and capabilities of their areas.

4.2. Recommendations

To raise awareness and proactiveness of local authorities in responding to climate change, it is needful to actively implement the following key measures:

The first is to innovate and diversify forms of communication. Besides traditional forms of communication, including newspapers, radio, and television, direct media should be applied to increase the spread of knowledge about climate change and measures to respond to it. Distributing brochures and holding conferences, seminars, and short-term training play a crucial part in helping local government officials update the valuable information on climate change.

The second is that documents on climate change in particular and other documents, in general, should be designed to be simple and easy to understand. Thanks to that, the local officials can actively and voluntarily self-study on issues related to climate change in a more favorable way. Abstract scientific terms and concepts are not encouraged.

The third is to educate and train officials at local authorities, improving their education, culture, sense of responsibility, quality, and capacity. In particular, it is principal to update them with information about social issues related to climate change because this is one of their weaknesses.

The fourth step is to develop scenarios and response models, as well as teach local officials how to respond to extreme weather and natural catastrophes, as well as act and react in hypothetical circumstances.

The fifth is to attach importance to socialization, environmental protection, and response to climate change in many forms. At the same time, it is essential to establish and perfect the supervision and inspection mechanism of organizations and communities. Furthermore, staff with weak capacity will be fired.

The last is to strictly handle violations of the Law on Environmental Protection based on supplementing and perfecting sanctions. It is substantial to create favorable conditions for local government managers to fulfill their duties and reward people with high achievements in climate change prevention and control, as well as response to its impacts.

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