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Adaptive Capacity Assessment of Rural Out–migrants: A Case Study of An Giang Province, Vietnam

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Industrialization and modernization in urban areas, and natural disasters and market variability in rural areas, have resulted in the recent acceleration of an outflow of rural migrant workers in the Vietnamese Mekong Delta to big cities in the hopes of improving their livelihoods. However, this process has been associated with many vulnerabilities and unsustainable livelihoods for out–migrants because they are ill–prepared for their new environments. This issue highlights a crucial need for adaptive capacity assessments that can contribute to the sustainable development of livelihoods of such vulnerable migrants. A household survey covering 100 respondents as well and interviews with a panel of key informants were conducted for this study to measure the adaptive capacity of migrants using a sustainable livelihoods framework. The study found that the adaptive capacity of out–migrants was 0.306. Numbers of primary laborers and their dependents, migrants' education, and land ownership were factors affecting income per capita, which is the main indicator of adaptive capacity. For sustainable livelihoods to be more achievable, improvements in access to education and job creation need to be simultaneously considered. In particular, more attention should be paid to vulnerable rural groups such as the poor, children accompanying their parents during the out–migration process, and people affected by development processes and policies.

Key words: adaptive capacity, out–migrants, sustainable livelihoods

INTRODUCTION

The Vietnamese Mekong Delta (VMD) occupies more than four million hectares of land, constituting approximately 12% of the nation's entire land mass. About 65% of its total area is used for agricultural production (GSO, 2011a). It is considered to be the most important agricultural region or "rice bowl" of the nation, annually contributing more than 50% of the total national rice volume and 80% of the country's rice exports (Hanh, 2012).

The rural workforce is still predominant in Vietnam, with a very high proportion (about 65% in 2011, reduced by 15% from the proportion in 2001) being located in the VMD (GSO, 2012a). This is despite the considerable efforts of the Vietnamese government to reduce the proportion of the agricultural sector and expand other sectors within the economy, as well as to stimulate industrialization and modernization in rural areas (MPI, 2006; Dung, 2010). The income gap between rural and urban areas has resulted in a considerable outflow of rural migrant workers to big cities or industrial zones seeking both permanent and temporary jobs (Diem, 2004). Of the total workforce in the Mekong Delta, 9.6% have migrated out seeking jobs, with the highest proportion of out–migrants (16%) originating from An Giang Province. The provinces and cities receiving the highest percentages of migrant workers in southern Vietnam are Binh Duong (64.8%), Dong Nai (31.4%), and Ho Chi Minh City (25%). This is because of intensive investments in these areas, which are the predominant industrial zones. However, the majority of rural out–migrants lack professional skills and knowledge to adapt to new environments (Olivia, 2009; Dung, 2010). Only 8.6% of the migrant workforce is professional experienced, with the figure for An Giang Province being about 8% (GSO, 2011b).

It is widely recognized that the out–migration process is affected by many factors, including social, cultural, geographical, and economic environments and conditions such as climate change and floods (Tai, 1998; Hoa, 1999; Ninh, 2007; Brown, 2008; Huy and Khoi, 2011). All of these factors can be divided into two broad categories: "push" and "pull" factors. The former prevail in the originating areas and include seasonal jobs, low incomes, and natural hazards. The latter attract people to the destination areas and include higher salaries, better infrastructure and services, and more scope for advancement (Dung, 2010; Huy and Khoi, 2011). Another important factor that causes out–migration is the high pressure of debt associated with vulnerability in terms of low agricultural production yields, flood–related damage, market variability, and natural resource–based livelihoods (Adger *et al.*, 2001; Huy and Khoi, 2011; Can *et al.*, 2012). According to Huy and Khoi (2011), "push" factors seem to be more important than "pull" factors in inducing the rural labor force to migrate out.

The migration process greatly contributes to the socioeconomic development, not only of the destination areas but also of the originating areas (Dung, 2010; Huy

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and Khoi, 2011). However, this process also results in many difficulties and vulnerabilities for the rural workforce because of their ill–preparedness. Aspects of this include their low professional qualifications, limited social networks, high living standards in the destination areas, and high numbers of dependents at home (Dung, 2010; Huy and Khoi, 2011). For these reasons, just a short time after migrating, migrant workers are induced to return to their places of origin. These processes of out–migration and return–migration thus contribute to the vulnerability of the rural labor force and create management hurdles for local governments.

To mitigate vulnerability and develop sustainable livelihoods within rural communities, studies are required that answer the following questions: (1) How strong is the adaptive capacity of the on–farm workforce? (2) What are the factors that affect adaptive capacity? (3) What policies are important for the development of sustainable rural livelihoods? In this study, we calculated the adaptive capacity index to measure the adaptive capacity of rural out–migrants in An Giang, one of the provinces in the VMD with the most out–migrants. The study results may partially answer the above questions and provide policy makers and other concerned parties with more information about the migration situation in the VMD. The study is organized as follows. The next section presents the study methodology, including the concept of adaptive capacity index and data collection methods. The following section discusses the results of the study, and the final section offers some important conclusions.

METHODOLOGY

Adaptive capacity is defined as the ability or preconditions that are necessary for a system or community to enable the adaptation process or adjust itself to be able to moderate or mitigate adverse impacts (Adger *et al.*, 2004; Tompkins and Adger, 2005; Peter, 2011). For this reason, this paper focuses on an assessment of adaptive capacity based on two main aspects as follows:

- Preconditions, including internal and external assets that enable communities to cope with and adapt to new environments.
- Adverse impacts caused by a context of vulnerability that are defined as unexpected changes such as high job competition and higher job skill requirements that may affect the livelihoods of out–migrants.

This study builds on the Sustainable Livelihoods Framework developed by DFID (2000) and the adaptive capacity assessment literature (Adger *et al.*, 2004; Nelson *et al.*, 2005; Birkmann, 2006; Peter, 2011) to assess the adaptive capacity of those who have migrated out to big cities. This implies that they experienced a change from on–farm work to permanent and temporary non–farm employment (Fig. 1). The approach used incorporates an examination of multiple relevant elements, including internal and external factors that constrain and stimulate the adaptation process or adaptive capacity of the community. In this study, based on the assumption that an individual or community is affected by a vulnerability context, external elements considered include new labor environments with increasingly high skill requirements for which on–farm laborers are not sufficiently prepared (Dung, 2010). Moreover, structures and processes introduced through interventions by governments and other sectors are also defined as external elements that stimulate and shape livelihood activities developed by communities to cope with and adapt to new environments. By contrast, livelihood assets are considered as internal elements that include physical, financial, social, natural, and human capital. Based on these forms of capital, individuals/households/communities devise their livelihood strategies to adapt to contexts of vulnerability and to external structures and processes. These assets are also regarded

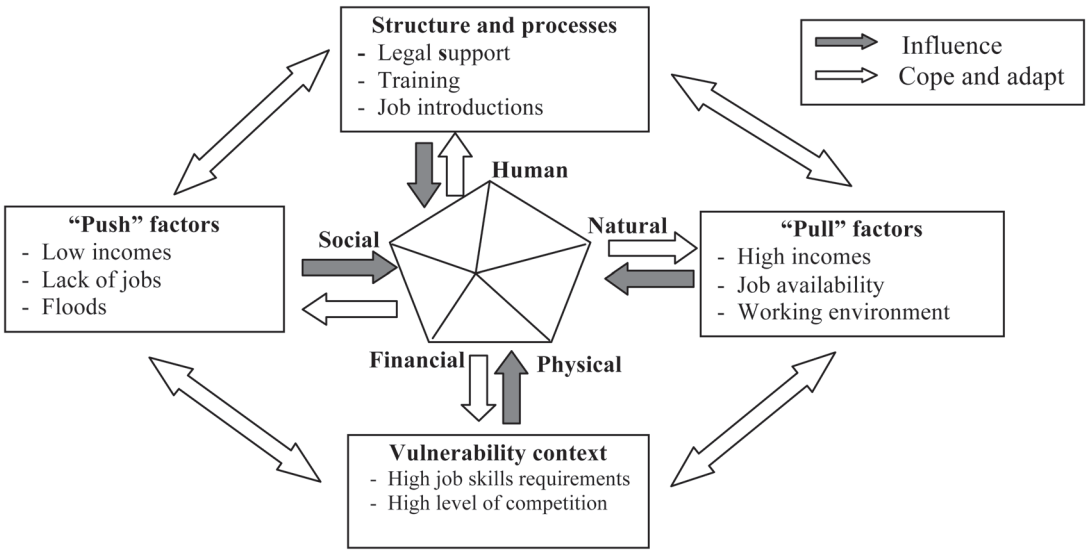

Fig. 1. Conceptual framework for measuring adaptive capacity.
Source: Modified by the authors in 2014 based on DFID (2000)

as core preconditions that facilitate communities in enabling the adaptation process (Fig. 1). They differ from people to people and from region to region. For this reason, adaptive capacities will also vary.

Calculating the adaptive capacity index

The adaptive capacity index (ACI) was calculated based on five livelihood assets: human, social, physical, financial and natural capital. Each form of livelihood capital includes many indicators that were identified based on a literature review (DFID, 2000; Ellis, 2000; Adger *et al.*, 2004; Nelson *et al.*, 2005; Birkmann, 2006; Nelson *et al.*, 2010; Peter, 2011; Can *et al.*, 2012) and semi–interviews conducted with migration experts and companies. Because indicators were measured at different scales, initial standardization was required to ensure that all of the indicators contributed equally to ACI. As for the calculation of the Human Development Index (HDI) introduced by Anand and Sen (1994), the equation used was as follows:

$$SI_i = (In_i - In_{min}) / (In_{max} - In_{min}) \quad (1)$$

where SI_i is the standardized index of indicator i;

In_i is the observed index of indicator i; and

In_{max} and In_{min} are the maximum and minimum values of indicator i.

After each indicator was standardized, all of the indicators for each form of capital (human, social, physical, financial and natural) were averaged to calculate the index of that capital using the equation shown below.

$$IC_j = \sum_1^i SI_i / i \quad (2)$$

where IC_j is the index for each of the five forms of capital, and j ranges from 1 to 5;

SI_i is the standardized value of each indicator; and

i is the number of indicators associated with each form of capital.

Once the index of each capital was calculated, the ACI of livelihoods to the migration process was arrived at using the weighted average of all forms of capital according to the following formula:

$$ACI = \sum_1^5 W_j \times IC_j / \sum W_j \quad (3)$$

where W_j is the weighting value for capital j;

IC_j is the index of capital j; and

ACI ranges from 0 to 1, where 0 is the lowest value and 1 is the highest value as in the HDI.

The values (W_j) used for calculating weighted averages were identified based on the importance of each type of capital in enabling the adaptation of rural migrants, as shown in Table 1. These values were discussed and evaluated during focus group discussions according to a scale of 10. Vietnamese are widely familiar with this scale because it has a long history of use in educational examinations. This method of weighting was aimed at integrating the importance of each indicator into the ACI index.

Table 1. Weighted values for calculating the adaptive capacity index

No.	Capital	W_j values
1	Financial	10
2	Human	10
3	Natural	9
4	Social	9
5	Physical	8
	Sum of W_j	46

Source: Based on Focus Group Discussions/ PRA exercises conducted in 2013

Data collection

Participatory rural appraisal and household survey tools were employed to collect primary data, with the former applying to semi–interviews held to gather information from key informants (local officers and representatives of companies) and focus group discussions focusing on the factors that cause out–migration, indicators for measuring adaptive capacity, as well as sustainable livelihood solutions in the context of migration. With regard to the latter, 100 agricultural production–based households that migrated out to big cities (Ho Chi Minh City and the provinces of Binh Duong and Dong Nai) were randomly selected for interviews. Interviews were conducted in the originating areas of the out–migrants, because we assumed that family members would have more detailed knowledge of livelihood assets than the out–migrants. The sample selection was also intended to contribute to mapping the adaptive capacities of different regions. Cho Moi District of An Giang Province was selected as a representative study site because its rate of out–migration was the highest in the province. Face–to–face interviews were used to collect data on livelihood assets–based adaptive capacity, reasons for out–migration, and difficulties, opportunities, and solutions relating to sustainable livelihoods.

RESULTS

A brief profile of Cho Moi District and its out–migrants

Cho Moi District is one of nine districts in An Giang Province. In 2012, the district's total population was 347,152, of which 172,771 (49.9%) were males and 174,381 were females. The total capable labor force of the whole district in 2012 was 201,657, accounting for 58% of the total population (DPCO, 2012).

Tables 2 and 3 show that the average household size was five members, with a mean of three laborers and two dependents. As in other districts and in the province as a whole, the main livelihood activities in Cho Moi District are agricultural production (cultivation of upland crops and rice). In recent times, the migration outflow has dramatically increased in Cho Moi. According to the annual report of DLISA (2012), out of 10,426 laborers who found new jobs, about 80% worked outside of An Giang Province, mostly in the provinces of Binh Duong and Dong Nai, and in Ho Chi Minh City.

Table 2 shows that, on average two out of five household members out–migrated to industrial centers. However, most of them lacked professional experience, with only 6% of the total number of laborers having received professional training. The average educational level of the migrated workforce was around 7 years of schooling, that is, they had not completed their secondary school education. Lack of professional experience and of higher education may have led to many of the vulnerabilities and the unsustainable living experienced by these migrants (Dung, 2010; Huy and Khoi, 2011). The study also reveals that nearly 93% of the out–migrants have changed their jobs at least once. Males and females constituted similar proportions of the out–migrant labor force (53% and 47%, respectively), and their ages ranged from 16 to 60 years old, at an average age of 32.46 years.

ACI of out–migrants

For this study, the sustainable livelihoods approach was used to identify factors affecting the adaptive capacity of out–migrants based on the five forms of livelihood capital. The ACI values are summarized in Table 3. Based on the calculated indexes shown in Table 1, a radar chart for each form of livelihood capital is presented in Figure 2.

Table 3 shows that the ACI of out–migrants was only 0.306. As discussed in the Human Development Report (UNDP, 2013), if the value for the HDI is under 0.466, this is considered low and suggests underdevelopment.

Table 2. Demographic characteristics of out–migrants

No.	Indicator	Mean	Max	Min	Std. Dev.
1	Household size	4.4	9	2	1.11
2	Number of dependents	1.57	4	0	0.78
3	Number of out–migrants	2.24	6	1	1.14
4	Age	32.46	60	16	9.62
5	Educational level	6.93	15	2	2.78

Source: Authors and survey conducted in 2013, n = 91

Table 3. Summary of ACI values

Capital	Indicator	Unit	Mean	Max	Min	Index
Human	Out–migrants' education	Grade	6.93	15	2	0.380*
	Out–migrants' experiences	Year	6.12	35	1	0.151*
	Communication skills	1 to 5	2.74	4	1	0.580*
	Social knowledge	1 to 5	2.79	5	1	0.447*
	Number of main laborers	Person	2.79	8	1	0.256*
Averaged IC of human capital						0.363**
Natural	Land ownership	Ha	0.69	4.6	0	0.151*
	Land per capita	Ha	0.15	1.02	0	0.149*
Averaged IC of natural capital						0.15**
Physical	Means for on–farm activities	1 to 5	2.33	4	1	0.443*
	Means for non–farm activities	1 to 5	2.25	4	1	0.416*
Averaged IC of physical capital						0.429**
Social	% of households are membership in associations	%	6.4	100	0	0.064*
	Social network	1 to 5	2.23	4	1	0.409*
Averaged IC of social capital						0.236**
Financial	% of household with less than 50% total income generated from migration	%	17.2	100	0	0.172*
	Total income of household	m.vnd	59.91	158	26	0.257*
	Total income from out–migration	m.vnd	44.97	132	15	0.256*
	Accessibility to credit	1 to 5	2.5	4	1	0.500*
	% of households with stable migration income	%	58	100	0	0.580*
Averaged IC of financial capital						0.353**
ACI						0.306***

Source: Author and survey conducted in 2013, n = 91
Note:: applied formula (1); **: applied formula (2) ***: applied formula (3)*

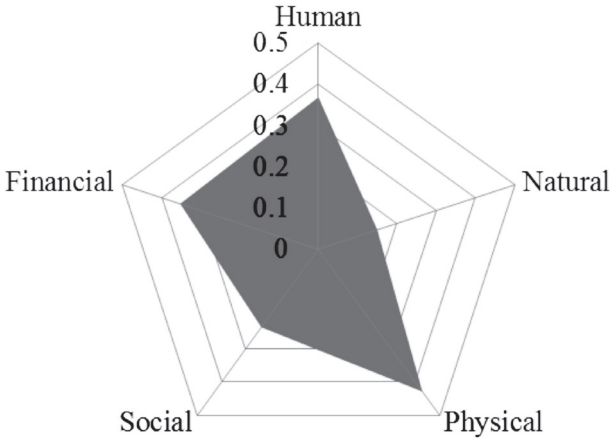

Fig. 2. Adaptive capacity indexes for out–migrant livelihoods.
Source: Based on a survey conducted in 2013, n = 91

Similarly, the value of 0.306 obtained in this study means that the adaptive capacity of out–migrants was extremely low, indicating a high level of vulnerability in the context of a significant increase in competition for jobs (Dung, 2010; Huy and Khoi, 2011).

Human and financial capital are widely considered to be very important in enabling laborers to adapt to and sustain themselves in a new environment. The study found that the values of these forms of capitals were low at only 0.368 and 0.353, respectively. The low adaptive capacity value of human capital may have been caused by the low educational level of out–migrants (6.93 years of education) and poor experiences of new out–migrants (6.12) (shown in Table 3). Moreover, although the study found a high proportion of primary laborers within households (2.79 laborers per 4.4 family members), the migrants were unable to efficiently realize their labor potential because of their low rate of land ownership per capita and their low level of education. A possible explanation for the low adaptive capacity value of financial capital could be that the main source of income for the majority of households was support received from out–migrants. Over 80% of households received more than 50% of their incomes sourced from out–migration activities. However, the total income from out–migration was low, as shown by a standardized index of 0.256 (see Table 3). This means that migrants were highly vulnerable, especially in the context of new work environments and their own lack of preparedness as a result of low educational levels and a majority being unskilled laborers.

Although natural capital does not directly contribute to the adaptation process, it plays an important role in supporting adaptive capacity and sustainable livelihoods through diversification of livelihood activities or sources of income. However, the value for natural capital was estimated to be the lowest at 0.15 compared with other forms of capital. A possible explanation for this could be the low rate of land ownership at 0.15 ha per capita. This value, together with the high proportion of primary laborers within households, provides clear evidence of push factors (not enough production capital) causing out–migration. Many new production models have been introduced and extension services have been improved for transferring new technology to farmers to improve land productivity and economic efficiency. However, low annual cultivation of land per capita (0.23 ha) leads to insufficient incomes to meet household expenditure (DPCO, 2012). In addition, Cho Moi District is subject to unpredictable patterns of annual flooding, with the magnitude of big floods becoming more serious (Can *et al.*, 2012; Tu *et al.*, 2012). More importantly, the Vietnamese government's recent programs[3] for consolidating mechanization in agricultural production have had some negative impacts on the livelihoods of the rural poor. For instance, those who work as hired workers have become unemployed. These factors have seriously impacted on livelihoods within communities and are considered to be the main factors leading to out–migration within the study area. To sum up, out–migrants have been facing vulnerability contexts both in their originating and destination areas.

The low adaptive capacity of social capital (0.236) revealed by the study could be caused by low rates of membership in associations or limited participation in social networks. These are very important avenues that enable migrants, especially females, to receive new relevant information and financial support (GSO, 2012b). The estimated value of physical capital (0.429) was the highest compared with other forms of capital. However, many respondents said that they still lacked agricultural production facilities in the context of high intensity production and modernization in agriculture, as well as hired labor.

Factors affecting adaptive capacity

One of the purposes of livelihood analysis is to substitute between each form of capital. For instance, financial capital can contribute not only to the expansion of human capital through improved educational levels, but also to natural capital through land ownership (the scale of production). The importance of financial capital for both current and future adaptive capacity is well recognized (Ellis, 2000; Nelson *et al.*, 2010). For this reason, a multivariate regression model was employed in this study to ascertain the factors affecting income per capita and, consequently, to provide some recommendations for improving adaptive capacities or reducing the livelihood vulnerability of out–migrants. The results of the regression are presented in Table 4.

Regression estimates show that the following variables: *Labor, Dependent* and *Membership* negatively affected the dependent variable, *Income*, while the variables *MigEdu* and *Land* had significant positive impacts on *Income*. It seems strange that the number of laborers would negatively affect per capita income at a significant

[3] The Vietnam Government's programs are specified within two decrees: 63/2010/QĐ–TTg and the modified decree 65/2011QĐ–TTg on policies for reducing post–harvest losses in agricultural and aquaculture production.

Table 4. Results of the regression of factors affecting the adaptive capacity of migrants[ψ]

Variables	Description	Mean	Coefficients	S. E.
Labor	Number of laborers	2.79	–0.1367**	0.0595
Dependent	Number of dependents	1.57	–0.1829***	0.0543
MigEdu	Migrants' education	6.93	0.0348*	0.0203
Experience	Years of experience	6.12	0.0048	0.0081
Land	Land ownership (ha)	0.69	0.1104**	0.0495
Network	Social network (1–5)	2.23	0.0362	0.0475
Membership	Membership in associations (1=yes, 0=no)	0.06	–0.3739*	0.1956
Migrant	Number of migrants	2.24	0.0315	0.0609
Headedu	Household head's education	5.66	0.0055	0.0205
Constant			2.7214	
R–squared			0.3023	
F statistic			3.90***	

Notes:[ψ] The dependent variable is the logarithm of total income per capita per year.
*, **, and *** indicate statistical significance of 10%, 5% and 1%, respectively.
Source: Authors' estimates, 2013

level of 5% (Table 4). In reality, land per capita in the study areas is minimal (0.15 ha) and the relationship between the number of out–migrants and per capita income is statistically insignificant. These two factors together result in inefficient labor (labor excess) because of the lack of availability of production materials when the number of laborers increases. To solve this problem, job creation and the introduction of job opportunities for the rural workforce are crucial.

The number of dependents negatively affected income per capita at a significant level (1%). This means that an additional dependent person created more financial burden for the sampled households. The significant positive coefficient of the migrants' education variable (*MigEdu*) means that if the educational level of an out–migrant was to increase (decrease) by one school year, income per capita would increase (decrease) by about 3.48% (Table 4). This finding highlights the need for better access to education and training for the rural workforce to be able to respond to an increasingly competitive job environment and the external impacts of development processes. This is especially the case for poor and vulnerable groups, such as children accompanying their parents during out–migration and poor individuals who previously worked as hired labor but are now unemployed because of the adverse impacts of agricultural mechanization.

The study also suggests that large–scale ownership of land has contributed to the diversification and stability of households' incomes because of the positive coefficient of the *Land* variable at a significant level of 5%. The study has documented how out–migration helped to significantly improve the conditions of both the out–migrants themselves and their communities in their places of origin. This occurred because richer households could rent land from out–migrated households and earn more money resulting from large–scale productive returns. At the same time, out–migrants were able to earn more money from renting out land instead of engaging in limited production from their farmland at a small–scale, as they had in the past.

Finally, membership in organizations such as farmers' associations, women's unions, and local offices has shown a strikingly negative relationship with income per capita in the study areas at a statistically significant level of 10%. This may be because of inappropriate allocation of time and the existence of a negative relationship between land ownership and membership in organizations.

CONCLUSIONS

A survey of rural out–migrants in An Giang Province, located in Vietnam's Mekong Delta, was conducted for this study using an ACI approach to analyze their adaptive capacities. The results highlighted a comprehensive ACI of 0.306 for the out–migrants' community, which is considered to be low. The main factors leading to low adaptive capacity were low values of financial and human capital at 0.353 and 0.368, respectively. These were caused by the substantial proportion of income resulting from migration in relation to total incomes, and the low educational level of migrants as well as the high proportion of their dependents. The ACI for natural capital showed the lowest value of 0.15 and can be attributed to limited land ownership per capita (0.15 ha). Similarly, the value for social capital was also low (0.236) because of weak social networks in the destination areas. Physical capital showed the highest ACI value (0.429).

Regarding factors affecting income per capita, the results of ordinary least squares regression showed that the number of primary laborers and their dependents, the level of migrants' education, land ownership, and membership in organizations were statistically significant determinants. Migrants' education and land ownership showed a positive relationship in contrast to other fac-

tors. Thus, to raise the adaptive capacity of migrants, improvement in education access and job creation need to be considered, especially for poor rural groups and people who are affected by external development policies and processes. In addition, more attention should be paid to providing the children accompanying migrants with educational access.

Although ACI is widely known to differ from region to region, and from community to community, the study only focused on one district (Cho Moi District) in An Giang Province. For this reason, it is not fully applicable to other regions and to the whole province in terms of decision– and policy–making. Given the lack of availability of a framework for establishing the specific scale for measuring the adaptive capacity of migrants in Vietnam, ACI calculation in this study was based only on internal values within migration groups, such as maximum and minimum values. External values were ignored, which, to some extent, led to biased measurements. Thus, there is a strong need for further in–depth research to make comparison among regions and the research on the efficiency of utilizing different forms of livelihood capital for adaptation options.

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REFERENCES

Adger, W. N., N. Brooks, G. Bentham, M. Agnew, & S. Eriksen 2004 New indicators of vulnerability and adaptive capacity. Technical report 7, Tyndall Center for Climate Change Research

Adger, W. N., P. M. Kelly, & H. N. Nguyen 2001 Environment, society and precipitous change. *In* "Living with environmental change: social vulnerability, adaptation and resilience in Vietnam" ed. by Adger, W. N., P. M, Kelly, and H. N, Nguyen. Routledge, London, 1–18

Anand, S., & A. Sen. 1994 Human development index: methodology and measurement: Human Development Report Office (HDRO), United Nations Development Programme (UNDP)

Birkmann, J. 2006 Measuring vulnerability to promote disaster–resilient societies: Conceptual frameworks and definitions. In "Measuring Vulnerability to natural hazards: Towards disaster resilient societies", ed. by Joern Birkmann: United Nations University Press, 9–54

Brown, O. 2008 Migration and climate change. IOM migration research series, 31. Geneva: International Organization for Migration

Can, N. D., S. Sophat, & S. Khom 2012 Vulnerability assessment of livelihoods in Lower Mekong Basin: Adaptation options for enhancing capacity of people living in the most vulnerable flood–prone areas in Cambodia and Vietnam. Final report submitted to Sustainable Mekong Research Network

DFID 2000 Sustainable livelihoods guidance sheets. DFID 94 Victoria Street, London, SWIE 5JL. UK

Diem, N. N. 2004 Urbanisation and its impacts on agricultural prouduction activities in Mekong Delta. Scientific Workshop on sustainable development in Mekong Delta. Can Tho City

DLISA 2012 Final report on labor, job creation and training program in 2011. Cho Moi district's Division of Labor, Invalids and Social Affairs, An Giang province, Vietnam

DPCO 2012 Plan for socio–economic development of Cho Moi district in 2013. People Committee of Cho Moi district, An Giang province, Vietnam

Dung, V. T. 2010 To restructure the rural workforce and impacts on households in Can Tho city (Vitenamese version). Final report submitted to Misnistry of Education and Training

Ellis, F. 2000 Rural Livelihoods and Diversity in Developing Countries. Oxford University Press, Oxford

GSO 2011a Current state of land use according to regions. General Statistics Office of Vietnam

GSO 2011b Population and labor. General Statistics Office of Vietnam

GSO 2012a Result of the 2011 rural, agricultural and fishery census. Statistical Publishing House

GSO 2012b Gender and the remittance of out–migrants: a case study in Ha Noi Capital. General Statistics Office of Vietnam

Hanh, N. Q. 2012 Everyday threshold concepts: implications for sustainable agriculture education in Vietnam's Mekong Delta. University of Bonn, Germany

Hoa, N. M. 1999 *Sociology – Fundermental issues*. Education Publishing House

Huy, H. T., & L. N. D. Khoi 2011 Analysis of labor migration flows in the Mekong Delta of Vietnam. *In* "Environmental Change and Agricultural Sustainability in the Mekong Delta" ed. by A. S. Mart and A. C. Peter. Springer Netherlands: 115–140

MPI 2006 The five year socio–economic development plan 2006–2010 (English version). Ministry of Planning and Investment, Ha Noi, Vietnam

Nelson, R., P. Kokic, S. Crimp, P. Martin, H. Meinke, S. M. Howden, P. D. Voil, & U. Nidumolu 2010 The vulnerability of Australian rural communities to climate variability and change: Part II—Integrating impacts with adaptive capacity. *Environmental Science & Policy*. **13**(1): 18–27

Nelson, R., P. Kokic, L. Elliston, & J. King 2005 Structural adjustment: a vulnerability index for Australian broadacre agriculture. *Agricultural Commodities*. **12**(1): 171

Ninh, N. H. 2007 Flooding in Mekong River Delta, Vietnam. Human Development Report 2007/2008. United Nations Development Programme

Olivia, D. 2009 Vietnam case study report: linkages between flooding, migration and resettlement. *Environmental Change and Forced Migration Scenarios*

Peter, B. 2011 Measuring adaptive capacity of farmers to climate change. Material for training course in Can Tho University

Tai, N. V. 1998 Free migration flow from rual – urban areas in Ho Chi Minh city. Agriculture Publishing House

Tompkins, E. L., & W. N. Adger 2005 Defining response capacity to enhance climate change policy. *Enveronmental Science and Policy* **8**: 562–571

Tu, V. H., N. D. Can, N. T. Trang, & L. V. An 2012 Livelihood vulnerability of households affected by flooding in An Giang province and adaptation solutions. *Scientific Journal of Can Tho University*. **22b**: 294–303

UNDP 2013 Human Development Report 2013: the rise of the South: Human progress in a diverse world. New York, USA