

Issue #35 | January / February 2011 | www.pacific-news.de | ISSN 1435-8360 | € 5,00

# Pacific News<sup>#35</sup>

News | Notes | Insights from the Asia-Pacific Region



**The System of Rice Intensification (SRI)**  
Challenges for Timor-Leste

**Heritage Preservation in Cambodia**  
The Case of Battambang

**Whale Watching in Patagonia, Chile**  
Guaranteeing a Sustainable Ecotourism?



Can the System of Rice Intensification, SRI, help Timor Leste? – 4



Ho Chi Minh City under Threat of Climate Change – 18



Whale Watching in Northern Patagonia – 23

- |           |  |           |  |
|-----------|--|-----------|--|
| <b>4</b>  | <b>Knowledge-Based Agricultural Innovations in Asia: The System of Rice Intensification (SRI) in Timor Leste</b><br>Martin Noltze, Stefan Schwarze, Martin Qaim  | <b>23</b> | <b>Whale-Watching Opportunities in Northern Patagonia, Chile</b><br>Cesar Guala Catalan, Rodrigo Hucke-Gaete, Jorge Ruiz Troemel |
| <b>10</b> | <b>The Agricultural Sector in Cambodia: Trends, Processes and Disparities</b><br>Jan Peter Mund  | <b>28</b> | <b>Pacific Populations in the First Half of the 21st Century</b><br>Richard Bedford  |
| <b>15</b> | <b>PN Photo Pages: Balancing Heritage Preservation and Redevelopment in Cambodia: The Case of Battambang</b><br>Walter Koditek                                   | <b>32</b> | <b>Impressions from Celebrations around Hoan Kiem Lake due to Hanoi's 1000th Birthday in October 2010</b><br>Michael Waibel      |
| <b>18</b> | <b>Climate Change Adaptation Framework: Linking Climate Change Action with Planning for Sustainable Urban Development in Ho Chi Minh City</b><br>Andreas Gravert |           |  |

# EDITORIAL

Dear readers

The cover page of the 35th issue of Pacific News (PN) depicts a five-year old Vietnamese girl, Susu. She is dressed up in a traditional silk cloth (áo dài) to honour the 1000th birthday of Hanoi - Thang Long. The celebrations of this event found their climax in a series of festivities around Hanoi's Hoan Kiem Lake from 1-10 October 2010. Susu's mother has made the picture at her daughter's special request during a walk around the surrounding park area on a sunny autumn day, 2nd October 2010. Additional photos on the last page show other impressions of this memorable event.

The articles cover a wide range of topics and countries. Agricultural issues in the still rather unknown state of Timor Leste are discussed by Andreas Noltze; Jan-Peter Mund debates the case of Cambodia. Andreas Gravert writes about the effects of climate change and its interrelatedness to urban development in the case of Ho Chi Minh City, Vietnam. Walter Koditek presents questions around heritage preservation in Battambang, Cambodia. Further, Cesar Guala Catalan and his co-authors discuss issues of eco-tourism in the context of whale watching in Patagonia and Richard Bedford provides an account of mobility among Pasifika.

Last but not least we would like to take the opportunity and to thank the members of our recently established Scientific Advisory Board for all their efforts in 2010. You significantly contributed to enhance the scientific standard of the PN. For 2011 we plan to get the PN accepted into one of the leading citation indexes.

To all academics and researchers out there: We encourage you to submit your own contributions. Authors guidelines can be found on our website. Send us an email if you have any questions about publication opportunities in the PN.

We hope you enjoy your read, the Editors

## Pacific News

The Pacific News (PN), ISSN 1435-8360, is a peer-reviewed semi-annual publication published by the Association for Pacific Studies (Arbeitsgemeinschaft fuer Pazifische Studien e.V., APSA) in co-operation with the Department of Human Geography of Hamburg University, Germany. The PN provides an interdisciplinary platform for an academic discussion of social, cultural, environmental, political and economic issues in the Asia-Pacific region.

In order to uphold scientific standards, the PN is implementing a peer-review process. Articles marked as „scientific papers“ have been peer-reviewed by two external reviewers. Articles marked as „research notes“ have been peer-reviewed by one external reviewer and a member of the editorial board. All other articles have been reviewed by the editorial board.

APSA-Members receive the Pacific News at no cost as a membership benefit.



The Association for Pacific Studies (Arbeitsgemeinschaft für Pazifische Studien e.V., APSA) was founded in 1987 at the Department of Geography of the University of Technology in Aachen. Activities include workshops, conferences, public lectures and poster exhibitions. The book series Pazifik Forum was initiated in 1990. In 1992, it was complemented by the publication of the semi-annual journal Pacific News. The latter has developed into the major activity of APSA in recent years. The APSA sees itself as one of the largest scientific networks in Germany for academics and practitioners with an interest in the Asia-Pacific region as well as academic exchange.

### IMPRINT:

#### Editorial Board:

Dr. Michael Waibel (V.i.S.d.P.),  
University of Hamburg  
Dr Julia N. Albrecht,  
Victoria University of Wellington

#### Scientific Advisory Board:

Dr Roger C.K. Chan, Department of  
Urban Planning and Design, Hong  
Kong University  
Dr Tara Duncan, Department of  
Tourism, University of Otago, NZ  
Dr. Rolf Jordan, Dep. of Geography,  
University of Vienna, Austria  
Dr Jan Mosedale, Dep. of Tourism,  
University of Sunderland, UK  
Dr. Jan-Peter Mund, University of  
Applied Sciences, Eberswalde, GE

#### External Reviewers:

Dr. Igor Besson, International  
Centre for Higher Education in  
Agricultural Sciences, Montpellier  
Dr. Harald Kirsch, GTZ Amman  
Tobias Danielmeier, Victoria  
University of Wellington

#### Cartography:

Claus Carstens

#### Layout Print Version:

Arne Löprick

All material published in the Pacific  
News expresses the views and  
opinions of the authors of this  
material.

Please submit your manuscript to:  
waibel\_michael@yahoo.de or  
julia.albrecht@vuw.ac.nz

Association for Pacific Studies  
(APSA), in co-operation with  
the Department of Geography,  
University of Hamburg, University  
of Hamburg, Bundesstrasse 55,  
D-20146 Hamburg, Germany.

Web: [www.pacific-news.de](http://www.pacific-news.de)

### COVER PICTURE

**Little Susu at the Celebrations  
for Hanoi's 1000th Birthday**

© 2010 Nguyễn Thị Thanh Huyền,  
Hanoi/Vietnam





# Knowledge-Based Agricultural Innovations in Asia: The System of Rice Intensification (SRI) in Timor Leste

Martin Noltze, Stefan Schwarze, Matin Qaim

**Abstract:** Growing concerns about the downturn of productivity growth and environmental problems associated with intensive paddy systems call for innovative practices in rice cultivation. Improved technologies have to increase productivity by simultaneously addressing land, labour, and capital constraints. The so-called System of Rice Intensification (SRI) may increase productivity in a sustainable way. Nevertheless, SRI adoption is still limited, and there are knowledge gaps as to what determines SRI adoption by smallholder farmers under different conditions. Using survey data from Timorese rice producers collected in late 2009, this study analyzes adoption patterns in the local context. Proper extension training helps to increase adoption, although at this stage partial adoption of the SRI package is commonplace. Moreover, significant differences in farm and household characteristics can be observed between adopters and non-adopters. The findings help to identify opportunities and constraints related to the dissemination of knowledge-intensive innovations in smallholder farming communities.

**Key Words:** System of Rice Intensification (SRI); Technology Adoption; Rural Development; Timor Leste

[Manuscript accepted as scientific paper on 2010-09-20]

In the aftermath of the recent economic turmoil, the Food and Agriculture Organization (FAO, 2009) estimates that more than one billion people are food insecure and undernourished worldwide. Many of the poor and vulnerable depend largely on the production of rice as the main staple food, but also as an opportunity for employment and an income source. It is estimated that current paddy production needs to be increased by more than 50% to meet the rising food demand over the next few decades (Mishra & Salokhe, 2010). Although rice production has increased substantially since the Green Revolution, annual growth rates are now facing a remarkable downturn (Spielman & Pandya-Lorch, 2009). In some regions, stagnating yields can be observed. High-input rice farming often involves mono-cropping, modern varieties, fertilizer, and pesticide use. There are concerns that the stagnating yields reflect the deterioration of the crop-growing environment as a result of soil degradation in intensive paddy systems. While in some regions overuse of chemical inputs has caused negative externalities, in many low-income countries limited resources still hinder the implementation of high-input systems. Accordingly, post-Green Revolution perspectives call for innovative strategies that are resource conserving and technically feasible, addressing livelihoods in an economically and socially acceptable way. The System of Rice Intensification (SRI), a knowledge-based low-external input technology, promises higher yields with no deleterious impact on natural resources at affordable costs for poor smallholder farmers.

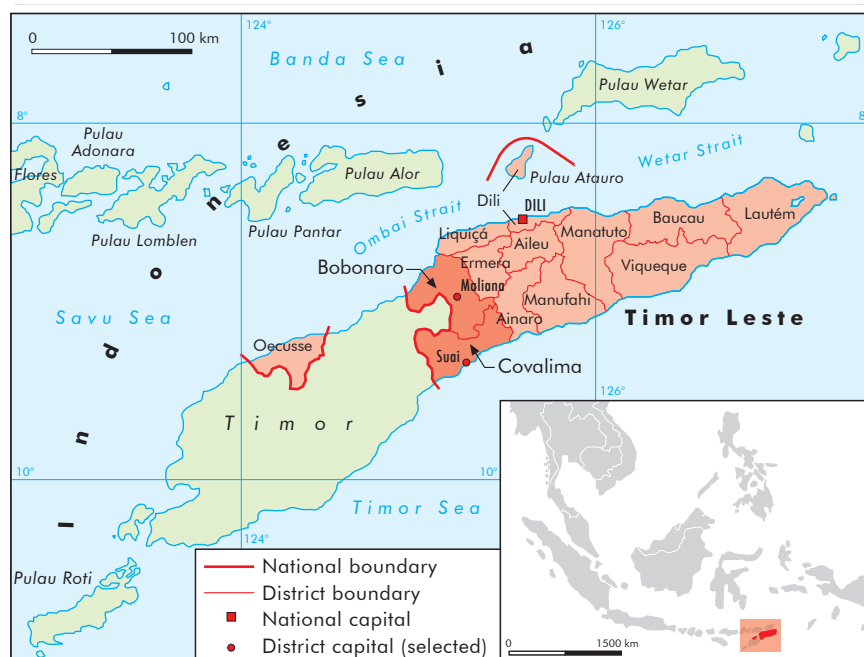




## Motivation of the study

SRI is already raising factor productivity and incomes for more than one million smallholders around the world on more than one million hectares (Meyer, 2009). Today it is applied in various agroecosystems in Africa and Asia: from tropical and coastal to semi-arid and mountainous regions. Experiences suggest that crop yields under SRI can be doubled, and even in some cases, quadrupled (Anthofer, 2004; Sato & Uphoff, 2007). Furthermore, several studies found a significant reduction in the total amount of water needed (Ceasay, Reid, Fernandes, & Uphoff, 2006; Uphoff, 2001). Poor water management often leads to land degradation through salinisation or water logging. Additionally, inappropriate use of pesticides causes ground-water pollution and loss of biodiversity. Low external input use (water and fertilizer, etc) marks SRI as an environmentally friendly technology for small-scale farmers in developing countries. However, Alagesan and Budhar (2009) found that farmers faced difficulties in the large-scale adoption of SRI in Tamil Nadul, India, due to knowledge deficits and labour shortages. Non-adoption and dis-adoption was examined by Moser and Barrett (2002) in Madagascar; they also cited problems relating to the higher labour needs of SRI. A study by Barrett et al. (2004) found that half of the gains from SRI adoption are based on farm and farmer characteristics rather than the technology itself.

Obviously, SRI is the subject of considerable controversy in the agricultural development debate. Concrete empirical evidence about the adoption performance of SRI under different agroecological and socioeconomic conditions remains limited. This article aims to contribute to the ongoing discussion by describing SRI adoption patterns among smallholder rice producers in Timor Leste and to explore differences between adopters and non-adopters. The research builds on primary farm survey data. Adequate definitions of knowledge-based land management practices need to consider the complexity of non-fixed technology packages. We do so by specifically accounting for partial adoption, that is, farmers adopting only certain components of the package but not others. The article is structured as follows. Firstly, a general overview of



Map of Timor Leste (survey areas of Bobonaro and Covalima districts are highlighted)

SRI will be provided. Secondly, the introduction of SRI in Timor Leste will be outlined. SRI adoption is defined at the farm household level using a two-group cluster approach, differences between adopters and non-adopters in terms of farm and household characteristics will be presented. In order to assure that key components of the technology are relevant among the derived group of adopters, principal component analysis (PCA) identifies defining factors determining SRI adoption in the given context. Finally, some conclusions will be discussed.

## SRI in practise

SRI relies mainly on changing farmers' agronomic practices for managing rice plants, soil, water, and nutrients. In the context of sustainable land management practices, SRI can be described as a complex agricultural production system, leading to higher agroecological and biological productivity without necessarily increasing external key inputs such as mineral fer-

tilizer and pesticides, labour or capital (Meyer, 2009). The concept of SRI was developed by a French priest, Fr. Henri de Laulanié, in the mid 1980s in Madagascar, to enable small-scale farmers increase rice yields using less water and seeds.

The main practices in the field include (i) carefully managed nurseries, (ii) application of compost, (iii) transplanting of young seedlings (10-15 days old), (iv) row planting (v) cultivation of single seedlings (vi) using a planting distance of at least 20x20 cm, (vii) intermittent flooding and (viii) regular weeding of plots (Table 1). Early transplanting of single seedlings and modified water management are the most prominent characteristics of SRI (Meyer, 2009). Together with row planting in high distance square patterns these principles support roots growth and tillering. A strong root system has positive impacts on plants' vegetative and reproductive phases via advanced nutrient uptake. The raising and selection of strong seedlings can

Components	Description	Adopted (%)	Factor loadings
i Nursery	carefully managed mat or tray nurseries	39.8	0,7319
ii Compost	application of compost in nurseries and on plots	12.3	0,3918
iii Transplanting	planting young seedlings < 15 days	57.9	0,7400
iv Row planting	square pattern row planting on plot	65.7	0,9023
v Single seedlings	only one seedling per hill	54.2	0,8917
vi Distance	distance of seedlings from 20x20 to 50x50cm	63.5	0,8964
vii Re-irrigation	alternate flooding and drying on plots	54.2	0,3637
viii Weeding	multiple weedings preferably with hand weeders	91.9	0,3578

Table 1: Adoption of components per household (N=397)



**Extension Training Maliana, Bobonaro**

be supported by carefully managed nurseries. Additionally, improved water management supports soil aeration and reduces overall water input. Uphoff and Randriamiharisoa (2002) found that continuously flooded soils constrain root growth and limit anaerobic microbial populations. Advantageously, SRI is able to reduce the total amount of water needed where water shortages occur. The water management practises are not primarily meant to be recommendations for rice cultivation in permanent flooded locations. However, if water levels are reduced to moist soil conditions, weeds are likely to grow. Thus, weeding is seen as another important SRI element to control for pests. Furthermore, organic input is added to enhance soil fertility by simultaneously facilitating soil aeration. Square pattern planting in high distances enables the use of mechanical weeders to reduce labour inputs. And finally, the incorporation of organic manure into the soil supports root activities by stimulating growth-promoting bacteria (Mishra, Whitten, Ketelaar, & Salokhe 2007).

Globally, the introduction of SRI differs slightly according to location-specific, agronomic and socioeconomic characteristics of target groups and program objectives. Accordingly, there is no common definition available capturing the complexity of this novel rice production management system. Finally, SRI was never meant to be a fixed technology package; it can rather be described as an expandable menu which is constantly modified through researchers' and farmers' experimentation. Farmers are encouraged to participate in the adaptation of SRI to specific socioeconomic and ag-

roecological conditions (Meyer, 2009). Therefore the adoption decision is strongly based on knowledge. Firstly, farmers have to collect information about the different components before deciding for each component separately to adopt or not to adopt, and if yes, how to adapt each technique to local conditions: the number of weeding per season, the quantity and quality of compost or the optimum distance between seedlings, and so on. Thus the knowledge character of SRI is simply not defined by 'knowledge on how to use the technology'; rather, it is the incorporation of a comprehensive 'knowledge of the effects of all eight components and the interactions among them'.

### **SRI in Timor Leste**

The young nation-state of Timor Leste, which is located in the Southeast of the Indonesian archipelago, is among the poorest countries in SE Asia. The country's economy depends largely on agricultural production, which sums up to one third of the national GDP, providing income to more than 80% of the population (Correia, Janes, Rola-Rubzen, Freitas, & Gomes, 2009). Rice is one of the main crops grown by Timorese farmers both as a staple food for home-consumption and as a source of cash income. However, average production levels of 2 tons per ha cannot meet local demand, so the country relies on rice imports which costs an estimated average of US\$ 58.5 million annually (Ministry of Agriculture and Fisheries, 2008). The domestic production is subsidized as the government is buying rice at a guaranteed price of US\$ 0.30 per kg of paddy, which is usually higher than the

price of imported rice. This import substitution strategy aims to cover higher production costs of relatively inefficient Timorese rice producers of today. Nevertheless, rising food prices and export limitations of important rice producing countries have intensified the risks of import dependencies. Hence, the government emphasizes strategies to increase levels of domestic rice production.

Since 2007, the Second Rural Development Programme for Timor Leste (RDPII), jointly implemented by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and the Timorese Ministry of Agriculture and Fisheries (MAF), promotes SRI for an increase in domestic rice production so as to meet the rising food demands of the fast growing Timorese population. The agricultural extension component of RDPII works through an advisory service approach with farmer groups. The focus is particularly on knowledge-based technologies, because levels of mechanization are low and farmers' access to external inputs is limited. Especially in the two western boarder districts of Bobonaro and Covalima, SRI has become the main component of extension services.

### **Empirical Approach**

In order to examine adoption patterns of SRI among small-scale rice producers in Timor Leste, a farm survey was carried out between August and December 2009. The survey covered the two districts of Bobonaro and Covalima (see map). Complete household lists had been generated, after which stratified random sampling was used to select 200 households from both participants (N=1,228) and non-participants (N=3,220) of SRI extension trainings. This sampling procedure allows for causal conclusions in an impact analysis but has no such implications in the given investigation. A total of 397 households were finally visited and interviewed, including 199 training participants and 198 non-participants. All six relevant lowland rice producing sub-districts are represented in the sample. For the interviews, a structured questionnaire was used to collect comprehensive information from all household members, including wealth indices, agricultural and non agricultural income generating activities, social capital with respect to exposure to institutions and detailed



information concerning rice cultivation practices.

## Results & Discussion

It cannot simply be assumed that participants in SRI training would be SRI adopters and non-participants would be non-adopters. The reason is that some participants may not have adopted, or that some non-participants may have adopted due to information and knowledge spill-overs. Moreover, adoption is not a simple 0-1 decision, because SRI involves different components, of which some may be adopted by farmers and others not. Against this background, an SRI component count system, or so-called 'adoption scores', which provide detailed information on the number of SRI components applied by each household was developed. The adoption of each component counts as one adoption score. High adoption rates of more than 50% for individual components suggest that these components are applied also beyond the group of training program participants (Table 1). Adoption rates of more than 60% are observed for weeding, row planting, and distance recommendations. This is not surprising as these components were already part of a former rice extension service known as Integrated Crop Management (ICM) and were seen as a stepping stone towards the introduction of SRI in Timor Leste (Deichert, Barros, & Noltze, 2009). In contrast, newer components such as composting or the use of mat or tray nurseries were only adopted by fewer farmers. The application of carefully managed nurseries is a practice that was particularly unknown to Timorese rice farmers until recently, but adoption rates might potentially increase with more experi-



Harvest in Covalima

ence becoming available. A lagged uptake can be expected for composting, too, as its controlled production takes months even under subtropical climatic conditions.

In order to classify farmers into SRI adopters and non-adopters, a two-group clustering approach was applied using Stata's partition-clustering method. This method allows group formation based on statistical principles, reducing the dispersion of data within a selected number of clusters to a minimum. Based on this procedure, adoption scores of  $<5$  and  $\geq 5$  identify non-adopters and adopters, respectively (Figure 1). As a result, 227 farm households were classified as adopters. 22% of these adopter households apply SRI on only some part of their rice areas next to traditional practices on the remaining parts. Highlighting the influence of SRI training indicates that among the training program participants, only 5% had an adoption score of less than 5, meaning that they were non-adopters (Figure 2). On the other hand, 19% of the non-training partici-

pants were classified as adopters. Not surprisingly, 79% of the non-training participants who have an adoption score of  $\geq 5$  take part in the government-promoted hybrid rice program, which has a number of components that are similar to those in SRI. Based on the utilization of hybrid seeds, differences include later transplanting ( $>15$  days), two seedlings per hill instead of one, flooded water conditions and specific recommendations on fertilizer use. In contrast to other rice intensification technologies, varieties are not part of SRI technology; as such, SRI can be fully applied taking hybrid seeds or other improved varieties.

Even though the introduced adoption scores give insights towards the intensity of the technology package adopted, it remains unclear which components determine SRI adoption in the given study. As each component is assumed to be relevant for SRI in the Timorese context, principal component analysis (factor analysis) allows for the establishment of an index representing the dimensionality of SRI

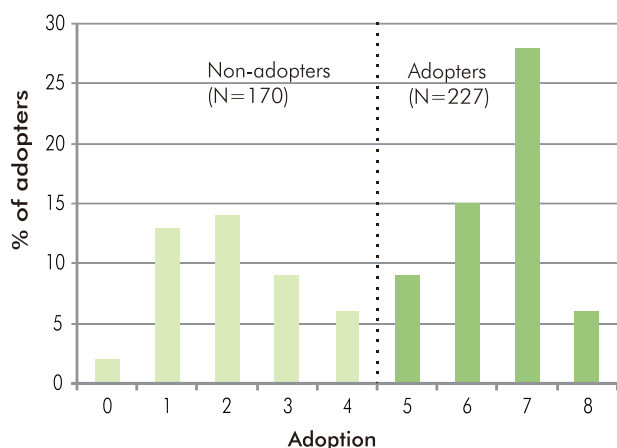


Figure 1: SRI adopters and non-adopters by adoption scores (%)

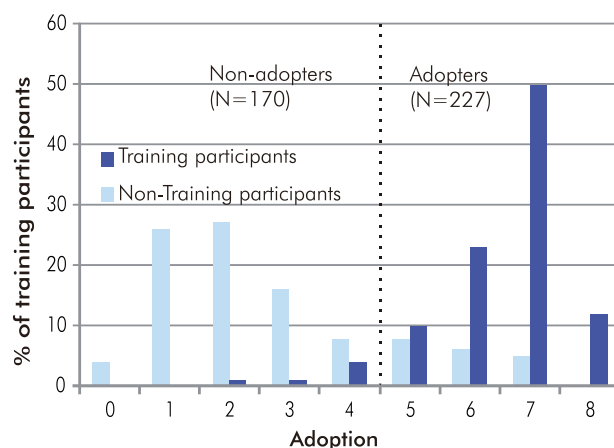


Figure 2: SRI training participants & non-participants by adoption scores (%)

Source all figures: Own survey data

in the Timorese context. Factor loadings are the correlations among the variable and the factor (Table 1). The higher the loading the more powerful is the variable in defining the factor's dimensionality. Results indicate that row planting, distance and single seedlings are the main defining factors for this SRI index, followed by transplanting young seedlings and the use of nurseries. Accordingly, weeding seems to be less specific to SRI as it is applied by most of the households (92%). However, the total number of weeding in one season is significantly different and 1.25 times higher compared to non-SRI plots. Circular re-irrigation and compost application do not have high impacts on defining the index. The components row planting, distance and single seedlings are applied by 100%, 98% and 93% of all adopter households, respectively. 92% of adopter households practise these three components in combination. 81% apply additionally transplanting of young seedlings. 78% of the adopters follow row planting, distance and single seedlings together with weeding and re-irrigation recommendations.

Most farmers in the sample are primarily rice farmers who cultivate additional crops for home-consumption such as cassava, sweet potatoes, and vegetables. Maize is the main secondary cash crop cultivated on the harvested paddy fields which is done by 51% of all interviewed households. Few households cultivate also cash crops like mung beans, soy beans or peanuts. Additionally, nearly all households keep livestock, mainly pigs (89%) and chicken (81%), but also buffaloes and cows (67%) or goats (38%). Except for chicken, livestock is seldom sold but it rather represents an asset which is used for festivities, ceremonies and dowry. Moreover, 46% of the households are at least seasonally involved in non-farm income activities such as construction work, home production, small-scale trading or work as off-farm hired labourers.

Adopting and non-adopting households differ by farm, household, and contextual characteristics (Table 2). On average, households own 1.88 hectares of land, of which 1.27 hectares are cultivated with rice. SRI adopters

Farm and location characteristics	All		Non-SRI household		SRI household		Sig. diff.
Total land area (hectare)	1,88	(1.78)	1,66	(0.95)	2,05	(1.29)	**
Total rice area (hectare)	1,27	(0.83)	1,13	(0.71)	1,38	(0.89)	**
HH living in Bobonaro (%)	48,86	(50.05)	34,71	(48.74)	59,47	(49.20)	**
Household and contextual characteristics							
HH size (number of HH members)	6,64	(2.27)	6,52	(2.29)	6,73	(2.27)	
HH head years of schooling (years)	4,09	(4.56)	4,05	(4.63)	4,12	(4.52)	
HH having nonfarm income (yes/no)	46,09	(49.91)	40,00	(49.13)	50,66	(50.10)	*
Access to formal credit sources (%)	11,33	(31.74)	7,64	(26.65)	14,09	(34.87)	*
Participation in SRI training (%)	50,12	(50.06)	5,88	(23.59)	83,25	(37.41)	**
Participation in hybrid programme (%)	16,12	(36.81)	4,11	(19.92)	25,11	(43.46)	**
SRI training participants in village (%)	36,55	(29.42)	23,27	(23.31)	46,50	(29.64)	**

Notes: Means (SD), \*\* and \* denote statistical significance at the 1% and 5% level respectively.

Table 2: Summary statistics by household (HH) adoption status

own significantly more land and cultivate significantly more rice. It can be assumed that larger farms tend to concentrate more than small farms on lucrative wet rice production, so that they are more eager to adopt innovative intensification strategies. SRI farmers are likely to be located in the district of Bobonaro (59%) as SRI was first introduced in the Maliana valley before extension recently spilled over to the southern district of Covalima. However, besides the starting time of large-scale promotion of SRI and the fact that SRI farms in Bobonaro tend to be slightly larger compared to Covalima, no fundamental differences can be detected among the two target districts with regard to adoption. Even though no significant differences can be found between the groups, overall, low levels of schooling can be considered as a challenge for the diffusion of knowledge-based technologies. On average, the household heads went to school for just about four years, only 36% completed primary school.

The share of SRI adopters, who have nonfarm income and access to formal credit sources such as banks, government programs or credit groups, is also significantly larger than the share of non-adopters. SRI as a low-input system promises to reduce input costs compared to conventional practices. However, SRI components are labour intensive and the costs of hired labour needed on top of the family labour could be an obstacle for adoption. Furthermore, adopters have significantly higher rates of participation in extension programs such as SRI or

the hybrid rice training program. The percentage of adopters is also higher in villages with a larger share of SRI training participants, suggesting that there are spill-over effects, for instance through indirect farmer-to-farmer extension.

Analyzing plot level data, 2009 average yield levels in both districts were 3.6 and 3.5 tons per hectare on SRI and non-SRI plots, respectively. It can be assumed that the uptake of knowledge intensive and laborious technologies can take several years until full effects occur. A comparative view indicates that SRI produces equal yields using less water and seeds. However, the extent of input reduction requires further analysis, which is beyond the scope of this article

## Conclusion

SRI is a knowledge-based technology, which consists of different components. In the case considered here it consists of eight components, not all of which are widely adopted yet. Whereas well-known techniques such as row planting and weeding are widely applied in the research area, components that have previously been unknown to farmers, like the use of compost and nurseries, lack widespread implementation. However, compost enriched soils combined with carefully managed seedlings are two key elements for the success of SRI as an integrated sustainable agricultural system. Accordingly, extension training should concentrate especially on these newer components.

Taking empirical data from two dis-

Source: Own survey data



tracts of Timor Leste the study found high adoption rates among SRI training participants in the selected sample. This supports the assumption that – with proper extension – knowledge-intensive agricultural production systems can be implemented in the Timorese context, which is characterized by low productivity levels and limited availability of high-input technologies. However, land and household characteristics seem to play a role in the adoption decision and thus can be assumed as important influencing factors for large-scale promotion. Owners of larger farms, located in villages where training participation is high, are more likely to adopt the new system. Accordingly, extension services have to find mechanisms on how to encourage small farmers in remote areas to adopt the innovative technology. It can be expected that a successful introduction of knowledge-intensive technologies needs several years until its full implementation.

Further research should focus on the influence of farm and farmer characteristics on the adoption of SRI components. The analysis presented here will be extended by multivariate regression analysis. Furthermore, yield differences and other outcomes may potentially be due to systematic differences among groups and should not be hastily attributed to SRI technology. Based on the data collected, proper assessment will be carried out in order to

estimate the impact of adoption.

## Acknowledgement

The authors thank the two anonymous reviewers for their valuable comments. The financial support of the European Commission (EC) and the Federal Ministry for Economic Cooperation and Development (BMZ) is gratefully acknowledged.

## References

- Alagesan, V., & Budhar, M. N. (2009). *System of rice intensification: exploring the level of adoption and problems of discontinuance*. *International Rice Research Notes*, 34(0).
- Anthofer, J. (2004). *Potential of the System of Rice Intensification (SRI) for Cambodia*. Report for the Food Security and Policy Support Project, GTZ, Phnom Penh.
- Barrett, C., Moser, C., McHugh, O., & Barison, J. (2004). *Better technology, better plots, or better farmers? Identifying changes in productivity and risk among Malagasy rice farmers*. *American Journal of Agricultural Economics*, 86(4), 869-888.
- Ceasay, M., Reid, W.S., Fernandes, E.C.M., & Upboff, N. (2006). *The effects of repeated soil wetting and drying on lowland rice yield with System of Rice Intensification (SRI) methods*. *International Journal of Agricultural Sustainability*, 4(1), 5-14.
- Correia, V. d. P., Janes, J. A., Rola-Rubzen, M. F., Freitas, J., & Gomes, M. (2009). *Prospects For Vanilla Agribusiness Development in Ermera and Manufahi, Timor Leste*. Paper presented at the 2009 AARES Conference.
- Deichert, G., Barros, J., & Noltze, M. (2009). *Introducing the System of Rice Intensification in Timor Leste - Experiences and Prospects*. Paper presented at the 7th PAWEEES Conference on Promising Practices for the Development of Sustainable Paddy Fields.
- Food and Agriculture Organization, FAO (2009). *The State of Food Insecurity in the World. Economic Crisis - Impact and Lessons Learned*. Rome.
- Meyer, R. (2009). *Agricultural Technologies for Developing Countries*. Karlsruhe.
- Ministry of Agriculture and Fisheries, MAF (2008). *Rice. Commodity Profile Series*. Dili.
- Mishra, A., Whitten, M., Ketelaar, J., & Salokhe, V. (2007). *The system of rice intensification (SRI): a challenge for science, and an opportunity for farmer empowerment towards sustainable agriculture*. *International Journal of Agricultural Sustainability*, 4(3), 193-212.
- Mishra, A., & Salokhe, V. (2010). *The Effects of Planting Pattern and Water Regime on Root Morphology, Physiology and Grain Yield of Rice*. *Journal of Agronomy and Crop Science*, 196(5), 368-378.
- Moser, C., & Barrett, C. (2002). *The system of rice intensification in practice: Explaining low farmer adoption and high disadoption in Madagascar*. Paper presented at the Water-Wise Rice Production Workshop, Los Banos, Philippines.
- Sato, S., & Upboff, N. (2007). *A review of on-farm evaluations of system of rice intensification methods in Eastern Indonesia*. *CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources*, 2, 54.
- Spielman, D., & Pandya-Lorch, R. (2009). *Millions fed: Proven successes in agricultural development*. *International Food Policy Research Institute (IFPRI)*. Washington, DC.
- Upboff, N. (2001). *Scientific issues raised by the system of rice intensification: a less-water rice cultivation system*. In: Hengsdijk H, Bindraban P, editors. *Water-saving rice production systems. Proceedings of an international workshop on water-saving rice production systems*, Nanjing University, China, 2-4 April 2001, 69-82.
- Upboff, N. and Randriamiharisoa, R. (2002). *Reducing water use in irrigated rice production with the Madagascar System of Rice Intensification (SRI)*. In Bouman B. A., Hengsdijk H., Hardy B., Bindraban P. S., Thuong T. P., and Ladha J. K. (eds.), *Water-Wise Rice Production*, 71-87. *International Rice Research Institute*, Los Banos, Philippines.

Martin Noltze [mnoltze@uni-goettingen.de] is a Research Associate and PhD student at the Department of Agricultural Economics and Rural Development, University of Göttingen.

He is currently working for the Second Rural Development Programme for Timor Leste (RDP II).

Dr. Stefan Schwarze [s.schwarze@agr.uni-goettingen.de] is Assistant Professor at the Department of Agricultural Economics and Rural Development, University of Göttingen.

Prof. Dr. Martin Qaim [mqaim@uni-goettingen.de] is Professor at the Department of Agricultural Economics and Rural Development, University of Göttingen.

# The Agricultural Sector in Cambodia: Trends, Processes and Disparities

Jan-Peter Mund

*Abstract: The agricultural Sector in Cambodia still contributes the dominant quantity to the GDP. It is the most important source of income and rural livelihood for around 80% of the Cambodian population. Cambodia's rural population faces new challenges like high population growth, embracing market economy and international private investment, nationwide food security and decreasing agricultural production conditions as a result of rapidly changing socio-economic conditions since 1990. Major agronomic innovations are the introduction of improved new varieties as well as rice intensifications systems like the SRI production system. With more than 2.3 million ha of rice production, there is no significant diversification in the agrarian sector. Only some vegetable, cash crop and fruit production have emerged to an increasingly important, farming system. Predominant agrarian strategies for small farmers as well as economic investors are the exploitation and even over-exploitation of natural resources with little investment into a more sustainable production.*

*Key Words: Cambodia, Agricultural Sector, Rice Paddy Production, Rural Disparities*

*[Manuscript accepted as research note on 2010-10-30]*

Since 2000, Cambodia has achieved overall national rice self sufficiency, although there are still regional and local deficit regions, i.e. on less suitable upland soils (World Bank 2005). The aggregated rice production has been stable in the last five years, with a surplus at the national level and according to official data national self-sufficiency in rice production was achieved in 2005 following years of deficiency (MAFF 2010). The increasing harvests since 2005 have boosted Cambodia's agrarian growth rate to 13.5% in 2007 and 2009. Severe disparities remain predominant at regional and particular at rural household level. A growing number of families are not able to survive based on their own rice production, especially in the areas affected by terrible floods in the Mekong floodplain or irregular severe drought on poor sandy soils in 2004-2005. However, an unconfirmed report from the IMF (2006) shows that farm output has continued rising since 2003 with better seeds and wider use of fertilizers.

Smallholder Rice Production, Kampot Province 2008



All photos © Jan-Peter Mund



## Secured food production and supply

Agriculture plays the most important role in Cambodian society by ensuring food security at community and national level as well as in the provision of employment and income opportunity for a growing population. About 75% to 85% of the population is employed in the primary sector, 65% does simply rice farming and around 90% of Cambodia's poor citizen lives in rural areas (World Bank 2005). Depending on the type or form of farming practices, agriculture could improve important environmental protection issues like watershed protection, ensuring quality of water and soil resource and biodiversity.

Today, trends and processes in land occupation and land use change are resulting in disparities in the Cambodian agricultural sector. Historically, differences in soil and water resources and subsequent suitable agricultural potential were the predominant factors for population distribution. Recent population dynamics are driven by land occupation of international investors and land shortage in the lowlands. Land use planning issues and economically motivated large scale land distributions characterize new disparities and transitions in the agrarian sector of Cambodia. Continuous intervention of the state into land regulations, ownership policy, land use planning measures and distribution of land use rights to large scale agro-industrial investors illustrate the Cambodian practise. Comparing Cambodia to other SEA countries the "agrarian question" concentrates primarily on the dispute whether or not concentration of land ownership is indispensable for a full capitalist transition into a modern economic agriculture. In 1991 Cambodia transferred its collective economy into a modern market economy. Since then land use patterns have undergone an intensive agrarian transition. Land and access to land became one of the most crucial factors in the Cambodian agriculture sector.

Still the agrarian production is focussed on subsistence and smallholder farming systems with rainfed rice as the major agricultural crop and traditional source of carbohydrate, along with legumes, soybean is important followed by mungobean and the oilseed crops including groundnut and sesame. Further, among commercial crops, su-

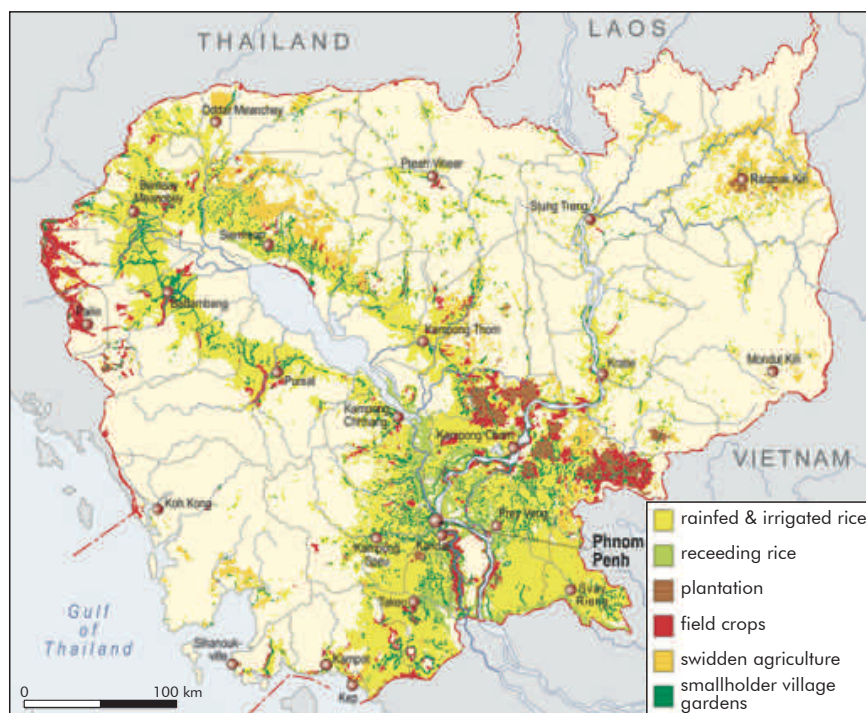


Fig. 1: Growing area of rice and other field crops in Cambodia

garcane followed by jute and tobacco is commonly grown (FAOSTAT 2008). Vegetables mostly occupy only village gardens and small fields around Phnom Penh, while economic cultivation of cassava and sweet potato is rising on large scale concessions. The customary significance of rice as the major staple food in Cambodia is emphasized by an average of 75-80 % of all calories derived from rice. According to O'BRIEN (1999) 86% of the total rice cropping area in Cambodia is either irrigated or rainfed lowland rice, only 8% is dry season rice, 4% is floating rice and 2% is upland rice (mapping by the author, based on topographic and

agricultural data (MAFF 2005, JICA 2002). Lowland rice with barely more than one crop per year represents the most abundant rice cultivation system, dependant on rainfall pattern and surface runoff for its water supply. Dry season and irrigated rice production is limited to areas close to major rivers and managed floodplains. Floating rice is grown in low-lying depressions that accumulate floodwater and is further divided based on depth and duration of the water (NESBITT, 1996). Rainfed rice production in the uplands is characterized by non banded fields and is primarily associated with shifting agriculture.

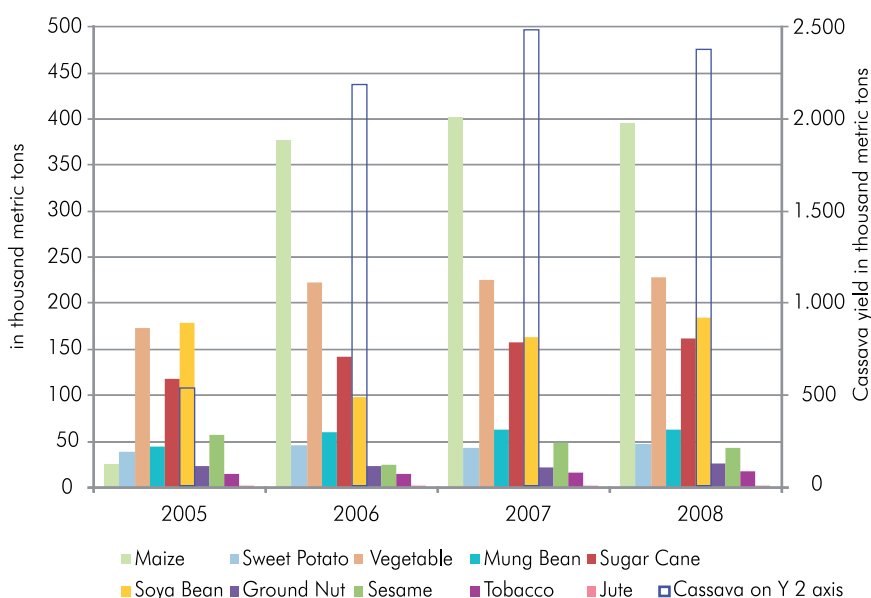


Fig. 2: Total production of major agrarian products 2005 – 2008

Design: Jan-Peter Mund, Cartography: U. Beha Pacific News Cartography: © Claus Carstens 2010

Source: FAOSTAT 2009



Cassava Plantation, Memot Province 2007

### Economic trends of agricultural production

Agriculture production is essential to the domestic economy of Cambodia and also is the main employment factor in rural Cambodia. According to FAO findings subsistence consumption absorbs approximately 55 to 60 % of the overall agricultural output (FAOSTAT 2008). As a result, the yearly average GDP per capita in rural areas remains very low around 125 \$ (Sophal 2008), compared to 280 \$ nationwide and more than 350 \$ in urban environment (Worldbank 2008). Rural agriculture is predominantly organized on the basis of smallholder farmer communities and families. Significant productivity gaps separate Cambodia into three major areas, productive south-eastern Mekong floodplains and north-western lowlands along the border to Thailand and less productive uplands regions. Various agricultural reports on Cambodia from 1995 until 2009, show that gross production of agricultural and food products is increasing, rice paddy area and production slightly decreases while the average yield per hectare slightly increases. But Cambodia still lags far behind neighbouring states of the Mekong catchment and remains still very low in international terms. In 1994, agriculture represented 45 to 50% of GDP, while in 2002 it still represents 36.2 % of GDP, respectively (ADB, 2005). Currently, 28.4% of Cambodia's Gross Domestic Product is derived from the agricultural sector (World Bank, 2009). Following a constant increase of 2-3 % over 5 years the agriculture sector growth remains stable mainly due to drought and late floods, as well as a declining fore-

stry production of -9.3% since 2007 (MAFF-Statistics 2009). Paddy production volumes reported by MAFF (2010) increases slowly since 2007 (Fig. 2) compared to the non robust 14.8% growth in 2005.

The area of national maize harvest has dropped over the last five years but yield increased while cereals harvest area production and yield shows no major changes (MAFF 2008). The reported harvest area and the production of roots, tubers and oil is growing, mainly by an increase of yields, except of oil production which was increased by enlarged production area due to large scale commercial agricultural concessions. During the last five years the production of fruits and vegetables has been steadily increased.

Today, the state sector plays the most important role in agricultural production by allocating large scale economic agricultural and forest concessions, while staying directly involved in rubber and oil production, only. There are eight state rubber plantation companies, a joint venture company in Tumring, Kampong Thom Province, and a privatized oil palm plantation in Koh Kong Province near Srey Ambrel. The area of industrial exploited rubber plantation is estimated at 55,900 ha (MAFF 2010).

Throughout Cambodia, the chemical fertilizer and pesticide market is rapidly expanding and their use is extremely common in Cambodian agriculture according to a CEDAC, study conducted in 2004 and another survey by Touch and DeKorte (2008). Two-third of Cambodian farmers interviewed are using pesticides at least for one of their crops especially in the ve-

getable, mung bean and water melon production. Significant pesticide use is also incorporated into dry season rice and tobacco production. The majority of Cambodian farmers believes that increased agricultural production can only be achieved by using more modern inputs rather than using modern inputs adequate and properly. This approach does contribute to increased production, but at higher costs on imported/external inputs especially fertilizer and pesticides. Since these inputs are mainly imported negative effects are frequent on farmers' household income and also relevant to the national economy. It is estimated that Cambodia has spent around \$US 64 million USD on chemical fertilizer and pesticides (FAO 2010).

### Rice production pattern

Rice, the major staple food, continues to be the principal commodity in this sector. Officially, the national average yield of rice is estimated to be between 1.65 and 1.8t/ha in the wet season and 2.05 t/ha in total which is low compared to other rice producing countries in the region like Vietnam 4.8t/ha and Lao PDR with 3.29t/ha in 2007 (IRRI 2008). During the last three decades, most of the Cambodian efforts have gone into slow improvements of the traditional smallholder rice farming system.

The average size of agricultural land for more than 2 million Cambodian farm households is about one ha or less than one hectare. In areas identified as high risk in terms of food security loss, the average size is 0.75 ha, (FAO, 1999), along with more than 1 million of the rural population, predominantly in the southern lowlands have no agricultural lands (Sokha et al 2005).

The rice production in 2002 was on the lowest level of production since the 1998 drought year (MAFF 2010). All domestic rice prices constantly increased in the period between 2000 and 2009. In 2007 prices surged and more than doubled within a single year span. Local and regional rice markets seem to be integrated as the prices of rice all roughly follow very similar trends. Data of average farm gate price of paddy in December 2003 shows that in provinces located around Tonle Sap Lake as well as the upper and central plains of Cambodia the price is lower while price of rice in remote provinces



depending mainly on market accessibility and small local production. Besides variety and other agronomic reasons the high geographic variation of rice yields suggests that problems of storage, transport and alternative non farming income opportunities exist as well.

As Cambodia's population is increasing rapidly, and employment opportunities in the non-agricultural sector are still limited, an increasing number of the rural youth are facing problems of landlessness and unemployment. Consequently agricultural landlessness is a serious and prevailing issue to Cambodian poor farmers (CEDAC 2004). Consequentially, rural households operate in a risky environment of regular flood and irregular drought crisis, food insecurity as well as crop and animal losses through diseases caused by a weak and ineffective veterinarian service.

### Other staple food

Obvious regional and economical disparities exist in the maize and other staple food sector as well. The main reason is a growing market for maize and maize fodder products in Thailand and excellent trading opportunities in Southern Viet Nam. The map in Fig. 4 is showing the extended growing areas for field crops along the north western Thai border and the south eastern Viet Nam border. Recently maize became the second largest food crop among Cambodian farmers. First between 1980 and 1990 the maize growing area decreased significantly but since the opening to a market economy the maize growing area is conversely increasing steadily from 71,460 in 2000 to more than 200,000 ha 2008 (MAFF 2010). The main maize growing area is located in Battambang province representing more than 61% of the total maize growing area in Cambodian. The average maize yield per hectare with 5.4 t/ha in Battambang is even higher compared to the national average yield of 4.3 ton/ha (FAO-Stat 2008). Reasons for a geographic trading advantage of Battambang and Paillin in comparison to other provinces are strong influences from neighbouring Thailand and Thai organised contract farming of Cambodian farmers.

Production of other staple crops for the national food market has decreased in the last 10 years while production of cash crops increases rapidly



Rice harvest in rural Cambodia, Kampong Cham Province 2009

with the introduction of contract farming and internationally leased agricultural concessions. Production of other significant crops like sugar cane, cassava, cashew and sesame have steadily risen for the last six years (MAFF 2008). The number of permanent cultivated crops like fruit trees and plantation trees increases constantly by innovations like Pitaya (*Hylocereus spec.*) and even grape. Besides rice, banana is still the most favourable crop among Cambodian farmers. Banana is grown all over the country while Kampong Cham remains well known as a major banana export province.

### Agricultural concessions in the upland as recent trend

The disparities and recent trends in the Cambodian agricultural sector are mainly driven by land tenure and land policy issues. Recently the national agricultural land policy tends to promote and lease large scale economic concessions rather than to rely on sustainable innovations and improvements

of smallholder farming systems. Consolidated land problems and increased economy, mainly by higher accessibility of local and national markets could lead directly to main investments into permanent crop production such as cashew nut or mango, especially in the Cambodian upland areas in the central and northern parts of the country. Cambodian uplands are defined as all landscape units above 20 m, asl (see Fig 4), and are characterized by a considerable imbalance of population and available land. This situation is different from the surrounding mountainous countries (Thailand, Laos, Vietnam), where upland begins at 300 – 400 m asl. Traditionally upland areas of Cambodia are more or less sparsely populated and economically neglected in comparison with the lowlands and central plains of the country. Upland farming systems are mainly destabilized by external factors, such as forest and agriculture concessions and immigrant settlers. Upland areas have become the major target area for migrating landless

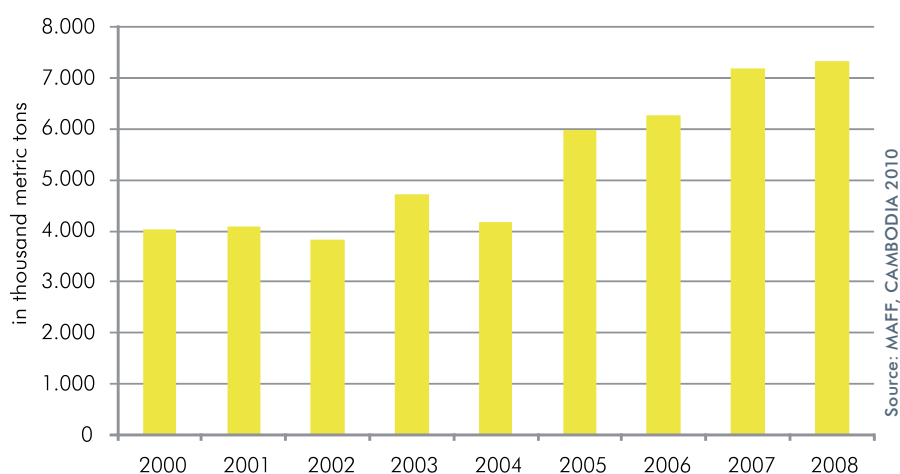


Fig. 3: Total rice production 2000 -2008

young farmers from the lowland.

Agricultural production in the uplands consists mainly of shifting cultivation, slash and burn cultivation, swidden agriculture and rainfed rice production in the valley bottoms, except during the Khmer rouge regime (1975-79), when hill tribes were forced to move into the lowlands to increase the rice production (compare Fig. 1). The long-established variety of annual and permanent crops cultivated on Cambodian upland soils is extremely high, with more than 40 annual species of herbs and spices, legumes, root crops, cucurbits and non-food crops. As many as 20 perennial species e.g. mango, banana, jack fruit, kapok, pineapple, coconut, papaya, tamarind, guava, lime, pomello, sour orange and betel leaf are grown, as well. Species like cashew nuts, mangosteen, sour sop and coconut gain significant importance in area and local revenue. Particularly, the cashew nut plantation area is growing fast since the late 1990s with essential support from Vietnamese traders. Promotion of cashew and other cash crops like coffee as valuable upland crops has been proven to exacerbate short-term deforestation in the Cambodian uplands as local villagers and immigrants from Vietnam and Lao PDR scramble to clear land for the cash crops. Dependence on cash cropping has shown to intensify debt and landlessness of the rural poor in almost all of the Asian developing countries, along with a negative impact on diet and community health in general.

Currently the major threats to upland agriculture in Cambodia are typical land issues like uncertain land ownership and unsecured tenure, expansion of uncontrolled deforestation of concession areas, followed by environmental degradation and increased erosion of fertile topsoil.

## Conclusion

The rice-based farming system remains the backbone of Cambodia's agricultural sector. Still rice is the main agricultural product and the country's staple food. Although the Kingdom of Cambodia has undergone dramatic and positive political, economic and social changes since 1993 and increased successfully and constantly the national rice production since 2004, its agricultural economy, especially the smallholder farming system remains vulnerable. Internal threats like the increasing pressure on land resources, due to uncertain land ownership and unsecured tenure as well as external shocks caused by global recession or climate change issues like increased floods and droughts in recent years also pose major challenges to Cambodia's thriving agricultural development.

## References

Asian Development Bank (ADB, 2005): *Asian Development Outlook 2006 : Economics Trends and Prospects in Developing Asia – Cambodia*. Phnom Penh.  
CEDAC Centre d'Etude et de Développement Agricole cambodgien (2004): *Pesticide use and Consequence in Cambodia*. Phnom Penh.  
Department of Forestry and Wildlife, MAFF, (2004,

2005): *Trends in Land Cover Changes Detection between 1996/1997 and 2002 by Remote Sensing Analysis*, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Cambodia. Phnom Penh.

FAO. 2009. FAOSTAT, <http://faostat.fao.org/site/291/default.aspx>, last accessed June 2010. Rome, Italy: The Food and Agriculture Organization of the United Nations.

IRRI (2008): *Rough rice production, by country and geographical region 1961-2005*. Los Banos, The Philippines.

Japan International Cooperation Agency (JICA, 2002): *Land Use dataset 2002*. Tokyo, Phnom Penh.

Ministry of Agriculture Forestry and Fisheries MAFF (2008, 2010): *Agricultural statistics 2000-2009*. Phnom Penh.

Nesbitt, H.J. Ed. (1996): *Rice Production in Cambodia*. University press. Phnom Penh Cambodia

O'Brien, N. Ed. (1999): *Environment: concepts and issues - a focus on Cambodia*. UNDP/ETAP Reference Guidebook. Phnom Penh, Government of Cambodia, Ministry of Environment. Phnom Penh.

Smith J. (2003): *Cambodian Agricultural Ecosystems*. Phnom Penh.

Sokha, P.; Yonekura, Y.; Sokecheath, S. & Saito, K. (2005): *Land issue study in Cambodia. Landlessness, Land dispute & Project affected people*. CEDAC and JVC, Phnom Penh, Cambodia

Sophal, Chan (2008), *Impact of high food prices in Cambodia*, in CDRI Policy brief, No 2, 2008, Phnom Penh Cambodia

Tichit, L. (1981): *L'agriculture au Cambodge*, ACCT, Paris

Touch, Visalsok; De Korte, Edwin (2007) "Utilisation of diversity in land use systems: Sustainable and organic approaches to meet human needs". *The Current Situation of Chemical Pesticide Use on Crops in Cambodia: Is there Any Driving Force to Halt this Application?*, in: *Proceedings: Tropentag, October 9-11, 2007, Witzgenhausen*

World Bank (2009): *Cambodia Rural Sector Strategy Note: Towards a Strategy for Rural Growth and Poverty Reduction*. Rural Dev. and Nat. Resources Sector Unit East Asia and the Pacific Region. Phnom Penh.

Upland agriculture, Preah Vihear Province 2007

Dr. Jan-Peter Mund [jpmun03@yahoo.com] is working as Professor at the University of Eberswalde GIS and Remote Sensing and serves as an advisor to the UN-Water Programme at the United Nations University in Bonn. From 2007-2010 he was a Senior Researcher at the German Aerospace Center (DLR).



# Balancing Heritage Preservation and Redevelopment in Cambodia

## The Case of Battambang

*Walter Koditek*

Urban heritage conservation is an important yet neglected task in Cambodia. Currently, the international community and the government concentrate only on the ancient temples of Angkor, largely ignoring the urban heritage in the country's cities and towns.

By doing so, they are missing out an important opportunity. Not only does integrated urban heritage conservation preserve the cultural dimension of a city's history, it can also contribute to the overall effort of poverty reduction through its potential for economic development, especially in the tourism and service sectors.

To achieve this, cultural heritage preservation must be harmonized with the changes necessitated by social and economic development, and it must be based on community participation and local understanding.



Photo below: Source unknown; photo left: Alex Bunzel







Rapid urbanization and modernization in Cambodia, like in other countries in the region, is increasingly putting pressure on urban land use for commercial purposes and investment. This is most evident in the capital, Phnom Penh, but is also the case in secondary towns and cities where much of the country's urban heritage is located. Land prices in these locations are very high and easily encourage land owners to sell their properties. State land with heritage buildings in prime locations is given to developers in exchange for new public facilities at less valuable locations. Further, small business and shop owners from core areas are increasingly investing in their properties for the sake of modernity. Inappropriate renovation and modernistic "facelifting" of traditional buildings thus contribute a lot to the destruction of the appearance and character of heritage areas. The lack of regulations at national level and of a legal framework on conservation, and the fact that heritage owners and decision makers alike seem to give little consideration to the value of heritage buildings, mean the survival of Cambodia's urban heritage is largely doubtful.





Overcoming these issues is key for the sustainable management of urban heritage in the future.

Despite the ongoing rapid transformation and widespread loss of heritage substance, there are many cities and towns in Cambodia where urban heritage is still in a fair condition and worthy of preservation. Among them is Battambang – the second-largest city in Cambodia with a population of about 142.000. The city has developed rapidly in recent years with numerous new investments and a great deal of construction activity. However, the inner city is still characterized by a largely coherent ensemble of about 800 heritage buildings. Its urban layout and heritage clearly illustrates the 150 years of urban history from Thai control through the French protectorate era to the *Sangkum Reastr Niyum* period of Cambodia's independence under King *Norodom Sihanouk*.

Battambang has been a pilot city for administrative reform within the national Decentralization and Deconcentration Policy since 2001. Since 2004 it has the right to set up its own Master Plan, which has led to the development of an integrated spatial de-

velopment plan for the city territory. Throughout the work on the Master Plan it became clear that the intrinsic value of the varied urban heritage of Battambang forms a huge asset for the development of the city. Following a baseline study in 2008, a preservation zone covering the historical shophouse quarter was defined and laid down in the Municipal Master Plan 2020, and the initiative "Our City – Our Heritage" was launched by the administration. The overall goal of the initiative is to preserve and safeguard the unique character and authenticity of the diverse built heritage of Battambang City. Measures and activities undertaken so far, aim at enhancing the recognition of existing cultural heritage resources by means of surveys, classification and regulations; at consulting and supporting the local communities to raise their awareness and acknowledgement of heritage conservation; at developing consciousness and capacity at the relevant authorities/administrative bodies on the local level; and finally at developing new business opportunities and local income through tourism and supporting appropriate adaptive re-

use of heritage buildings.

Despite a first track record of successful activities carried out, such as the piloted restoration of the 'Provincial Hall' and the accomplishment of a major awareness campaign involving various government agencies, households, schools and the private sector, there is still a long way to go. However, with the effort and long-term commitment of all stakeholders Battambang could possibly become a future role model for a local approach to integrated heritage conservation management in Cambodia.

As shown, such an integrated initiative should form part of a comprehensive urban development strategy and be linked to other development initiatives aimed at meeting the basic needs of the urban population. If urban heritage can be preserved for new economically viable developments such as tourism and tourism services, integrated heritage management could contribute to the overall effort to combat urban poverty, fostering not only the progress of historical districts, but the collective advancement of the larger urban population as a whole.

Photo Background: Walter Koditek; photos left: Alex Bunzel

Walter Koditek [walter.koditek@cimonline.de] worked from 2007 until 2010 as a DED-Expert and urban planning adviser for the Master Plan Team of Battambang Municipality. He is currently working as a CIM-Integrated Expert at the Urban Development Agency of the Ministry of Construction, Hanoi.



# Urban Adaptation Planning Framework: Linking Climate Change Action with Planning for Sustainable Urban Development in Ho Chi Minh City

Andreas Gravert

**Abstract:** After decades of scientific debate about global warming and a dramatic increase of public and political awareness in the last five years, the notion of climate change and the need for action has finally arrived on the desks of Ho Chi Minh City's (HCMC) administration. City officials are now obliged by the national government to set up adaptation measures. The prevailing urban development practice leading to environmental hazards and increased exposure to climate change is now likely to be reconsidered. The Megacity Research Project HCMC "Integrative Urban and Environmental Planning Framework – Adaptation to Climate Change" aims to use this window of opportunity to develop, implement and institutionalize innovative planning instruments for an urban development, which is better adapted to the local environment. This paper shows the interrelation of current urban development challenges and future climate change impacts and gives an introduction to the Megacity Research Project HCMC. Hereby, barriers and opportunities will be discussed towards the implementation of climate change response measures.

**Key Words:** Urban Adaptation Planning Framework; Sustainable Urban Development; Climate Change; Ho Chi Minh City

[Manuscript accepted as research note on 2010-11-05]

In terms of population exposed to climate change impacts HCMC is considered being one of the ten most vulnerable cities in the world (ADB 2010). This vulnerability is of particular concern because of HCMC's economic and demographic significance in Vietnam. With a de facto population of more than eight million inhabitants, the city accommodates 10 % of the national population, generates about one quarter of the national GDP, and receives one fifth of Vietnam's FDI (ibid.; GSO 2010). Growing beyond its administrative boundaries "a mega-urban region is in the making" (Waibel 2009a), accounting for about half of the total FDI volume and more than 15 million inhabitants.

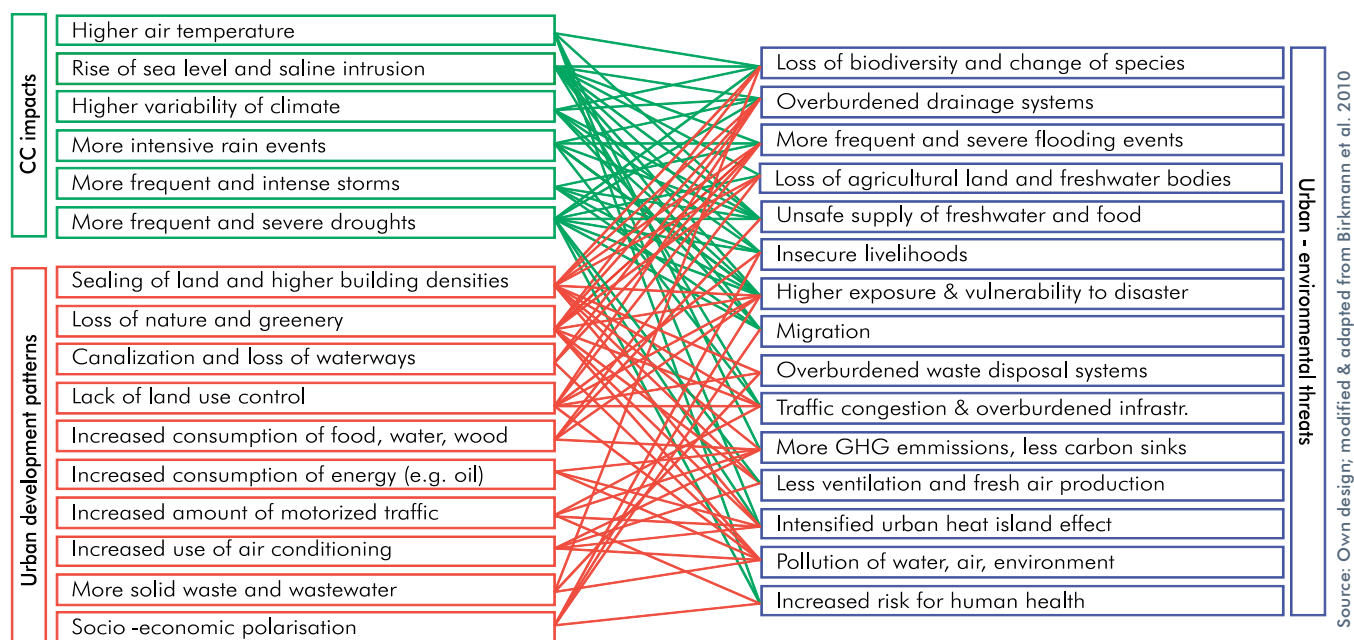
## Climate change versus urban development

Located on the north-eastern edge of the Mekong Delta and 50 km inbound from the South China Sea, HCMC is built mostly on low-lying and marshy land. Over 60 percent of the administrative urban area is situated below 1.5 m a.s.l. and 40-45 percent below 1 m (Long Phi 2007). Thus, with the predicted sea level rise of one meter un-

til the end of this century almost half of the administrative area of HCMC would be permanently flooded, the tidal range of about three meters adds to this (Van Trung 2009). The rising sea level also threatens fresh water supply and harvests, both already affected by saline intrusion (MoNRE 2010). Another predicted local climate change impact is the higher climate variability leading to droughts as well

as more intense rain events, which are more and more frequently disturbing the operability of the city (cf. Vietnam News 2010). Flood risk and loss of agricultural productivity threaten livelihoods and already cause environmental migration in the densely populated Mekong Delta region (Warner et al. 2009). Also, with a further increase in temperature, health and comfort of urban living will deteriorate while de-





Source: Own design; modified & adapted from Birkmann et al. 2010

Figure 1. Urban-environmental threats deriving from both climate change (CC) impacts and urban development patterns

mand for cooling will increase. The main cause for increasing temperatures in HCMC, however, lies not with global warming but rather with local urban development (Storch et al. 2009; Waibel 2010). Higher building density, less air convection, reduced water surface, less greenery, as well as increased production of waste heat add up to the so called urban heat island effect. As a result, temperatures in the city centre are up to ten degrees higher compared to the rural periphery of HCMC (Thi Van et al. 2009).

The interrelatedness between urban development and climate change issues becomes even more apparent with regard to the frequency and severity of floods. While, historically, HCMC developed mostly on elevated grounds, it is now rapidly expanding on low-lying marshlands towards the sea. The most ambitious large-scale urban expansion projects in the South (Saigon South, see picture on p. 18 above) and East (Thu Thiem) of the city centre already experience severe problems with flooding and erosion. Some parts of these new urban areas, although being developed for higher income groups with massive infrastructure investments, are flooded two times a day due to high tide. The 'hardening' of the cityscape with the extensive sealing of land and the channeling of natural waterways lies at the heart of the city's flood-problem (Carew Reid 2009). The loss of local water retention space and natural drainage capacity leads to higher water levels and flooding not only in

new urban areas, but also in consolidated areas that were considered flood safe in the past. Climate change impacts such as sea level rise and increased intensity of rain events simply add to this problem of overburdened drainage systems (see fig. 1).

### Urban planning: Key to climate change action

Effective urban and regional planning is considered to have a key role for a city's adaptation to climate change (UN-Habitat 2009). The constant endeavour to integrate different sectors, stakeholders, and administrative entities as well as the combination of long-term thinking with short-term action make urban planning an essential element of climate change response – clearly being a cross-cutting and long-term issue. The core function of urban planning – the steering of land use patterns – is a basic tool for adaptation, allowing for an energy-efficient and climate change adapted distribution of settlement structures, or the preservation of a network of green corridors for ventilation and flood protection (ARL 2009).

However, while scholars widely agree on the key role that urban planning could have, the critical point seems to lie in the lack of effectiveness and the implementation deficit (cf. Bulkeley & Betsill 2003). This is particularly true for a rapidly developing metropolis such as HCMC. Here, market forces and informal dynamics constantly outweigh conventional statist master plan-

ning. To prepare HCMC's urban planning system for the threats related to climate change therefore must include measures to improve its effectiveness (Birkmann et al. 2010).

One of the basic challenges for effective climate change action is the dominant growth-paradigm that serves as legitimization of the authoritarian ruling regime. Planners and decision-makers mainly get rewarded for the acquisition and facilitation of investments. If they prevent real estate development in water retention areas along rivers for example, they get not rewarded. Discussions with local planners revealed that even if they were (publicly) instructed to implement climate change action, these instructions lacked commitment and the underlying policy directive remained the rather unconditioned acquirement of investments. As a result, some planners in HCMC state that the legal framework needs to be more stringent and clear regarding environmental concerns. In fact, they miss legal procedures which enable them to classify respective projects as not adapted to changing environmental conditions and finally to refuse approval.

If such legal procedures lack, adaptation measures are more likely to get implemented if they fit within the overall development path (O'Riordan & Jordan 1999). This means that no-regret options are required in which climate change response does not compromise (other) development objectives. Adaptation and mitigation measures therefore should link to exis-





A new urban area under construction within an area prone to flooding

ting problems that need to be solved such as urban flooding, or they should encourage investments/save resources, e.g. a tax exemption for solar water heaters.

Another major barrier for effective climate change action is the top-down orientation of the planning system in Vietnam. Often, planners on the local level do not feel competent to push adaptation measures as long as they are not instructed to do so. The general lack of horizontal integration leads to overlapping competencies and competition among agencies, such as between the Ministry of Natural Resources and Environment (MoNRE), in charge of land use planning, and the Ministry of Construction (MoC), in charge of construction planning (Webster & McAlwee 2009). Each sector develops its own climate change action plan, although effective flood protection, for instance, would afford a more concerted response. The introduction of the HCMC Climate Change Steering Committee in 2008, however, gives evidence of a gradual change in this regard. This working group brings together all relevant departments, including the sectors of construction and planning, to discuss challenges of and response to climate change.

Climate change action is also impeded by a lack of capacity, which is most prevailing in peripheral institutions. While national and municipal authorities in Hanoi and HCMC are well trained and often in constant exchange with national and international experts, other province administrations as well

as district and sub-district levels in the HCMC metropolitan region are rather left behind. A survey across provincial administrations in the HCMC region revealed that local authorities are "confused" about climate change and related policy demands. It is not surprising that the Department of Planning and Architecture of HCMC is the only planning department in the region currently working on climate change policies. Further, solely the environmental departments of HCMC and Ba Ria-Vung Tau began to physically prepare the climate change action plan that was requested by MoNRE in 2009. Other barriers such as uncertainty, lack of funding and overburdened administrations are also more prevailing in less developed provinces and districts.

Experiencing more and more environmental hazards, HCMC's urban planners and decision-makers as well as the general public have become highly aware of threats deriving from global and local environmental change. This, however, did not lead to a modification of urban planning and project approval procedures. More recently, with reference to the "National Target Program to Respond to Climate Change" issued in December 2008 (MoNRE & Prime Minister 2008), laws and directives are being promulgated which oblige the local administration to set up action plans and implement measures. These governmental instructions, the frequency of urban-environmental hazards as well as the public awareness created a certain pressure to act in local administrations. As a result, the de-

mand for international cooperation, research, and new approaches in the field of climate change policy has risen abruptly in the last two years.

## The project approach

Considering the congruence of problems deriving from climate change and those deriving from urban development, this demand for climate change action creates a valuable window of opportunity for making urban planning more adaptive to local environmental conditions. To use this opportunity is a basic motivation of the Megacity Research Project. It is aimed to develop, implement and institutionalize planning instruments, which ensure the long-term integration of climate change response and urban-environmental policy into plan- and decision-making processes.

After a thorough analysis of the planning system and a series of workshops with urban planners and decision-makers in the HCMC metropolitan region, certain administrative procedures regarding urban planning and construction have been identified where the effective application of environmental criteria is lacking. To fill this gap, the project applies a dual strategy: On the one hand, a formal top-down oriented approach is being followed concerning the re-adjustment of the legal framework that frames lower order decisions and decision-making processes. On the other hand, a bottom-up strategy is adopted, which aims to build capacity in the urban planning and construction sector. To achieve this, a diverse set of measures is being applied.

## Regulatory measures

The regulatory approach relates to the top-down oriented planning system of Vietnam in which the national government and other national institutions define the general content of local plans. Guidelines for resource efficient and climate change adapted urban structures are being developed in cooperation with partners in administration, private sector, and research institutions in HCMC. Opportunities for their legal integration, e.g. into the new urban planning law, were identified and the implementation of guidelines is now examined in cooperation with the MoC and related national institutes.

The implementation of guidelines is



pursued on different spatial levels. At the overall level of the city, guidelines will mainly be related to environmental vulnerabilities, general strategic development, and metropolitan management. The steering of large-scale land-use patterns with the preservation of green corridors, the determination of water retention areas or the sustainable distribution of settlement structures is a central issue. These guidelines will act as a blueprint for the adjustment of the HCMC Urban Construction Master Plan and the Regional Development Plan. Regarding the neighbourhood level guidelines should relate to zoning and detailed plans. Sustainable urban design solutions must allow for high densities while at the same time prevent urban flooding and urban heat island generation. At the building level specific consideration has to be given to aspects such as durability, ventilation and openness, thermal insulation and energy saving. In the latter case, the MoC is being consulted regarding the revision of the building code.

The development and implementation of guidelines provides a promising opportunity to mainstream climate change response across levels and localities nationwide. However, this formal top-down oriented approach does not ensure the effective application of these guidelines on the local level. In fact, the fundamental problem of the Vietnamese planning system seems to lie not in the lack of formal regulations, but rather in the correct application and implementation of these. For this, capacity building among the local administration is necessary, among other. The regulatory top-down approach therefore has also to be complemented by a bottom-up strategy implying a diverse set of activities. Here different measures are applied on the different levels.

### Bottom-up measures

In a region as closely interlinked as the HCMC region – in terms of environment, economics and social issues – the cross-cutting challenge of climate change requires regional coordination; especially when land-use competition and institutional fragmentation are among the basic elements constituting the vulnerability of the agglomeration (Waibel 2010). Therefore, response capacity – here understood as the ability to undertake both adaptation and mi-



Regular flooding due to high tide at a middle class settlement near Thu Thiem

tigation (Tompkins & Adger 2005) – is built on the *conurbation* level through workshops with roundtable character, which bring different stakeholders, sectors and/or provinces together. Structural barriers for an integrative adaptation approach, such as the competition between provinces, will not be overcome by workshops. Horizontal learning and improved communication between departments, however, are key elements of good regional governance that can be facilitated.

On the neighbourhood-level planning studies are being drawn serving as a showcase to test, evaluate and demonstrate the potentials of climate change adapted and energy efficient urban designs. Considering the development pressure HCMC is facing now and in the near future, these studies must allow for high densities, particularly in elevated and less flood-prone areas. This need for compactness in mind, the challenge is to provide for enough water storage, infiltration and run-off, as well as prevention of urban heat generation. The results will be promoted to relevant stakeholders in the real estate market. In addition, a community based adaptation (CBA) scheme focuses on low-income neighbourhoods, which are considered particularly vulnerable. CBA-measures range from community mobilization and capacity building to community driven adaptation strategies and actions. To achieve this, the project team is closely cooperating with the non-governmental organization Environment and Development in Action Vietnam (ENDA).

On the building level a design catalogue on climate-adapted and energy-efficient housing has been developed as part of the promotion of sustainable building practice. The development of the design catalogue is based on a representative survey of more than 400 “new consumers”, members of the rapidly emerging urban middle class population, which is currently in the process of taking over more and more resource-intensive lifestyles (Waibel 2009b). The design catalogue focuses on the most popular house typology in Vietnam, the shophouse (*nhà phố*). It will inform about technical solutions including recommendations on functions and space composition, construction and material, shading and lighting, ventilation and cooling, energy and water supply, as well as energy-saving behaviour. By providing sustainable design solutions the catalogue will empower and encourage future home owners, architects, developers, companies as well as architecture students to design and construct houses more climate change adapted and energy efficient.

### Summary and outlook

HCMC is confronted with severe urban-environmental threats deriving from urban development not adapted to local environmental conditions. Climate change impacts such as more frequent and intense rain events simply add to the environmental hazards the city already is experiencing. Adaptation measures therefore should apply to current challenges resulting from

Source: © R. Eckert 2009

View of HCMC's skyline from Thu Thiem peninsula



urban development. Moreover, mitigation measures have to be targeted at those sectors of the urban society whose contribution to global greenhouse emissions is already becoming noteworthy, e.g. those of the emerging urban middle class.

The Megacity Research Project aims to link climate change action with sustainable urban development. Innovative planning instruments are being developed that target at planning and decision-making processes rather than outcomes. The planning system shall be enabled to make decisions and plans, which are better adapted to local environmental conditions. The project thereby applies a dual strategy with both top-down and bottom-up measures: Whereas a regulatory approach provides good opportunities to institutionalize climate change policy nationwide, bottom-up measures are needed to build local capacity and test innovative planning approaches. The final objective of the project is to link top-down and bottom-up processes and to create an adaptive "learning system" that integrates both contrasting concepts.

Effective climate change response in the urban planning and construction sector in HCMC is largely missing, although local planners and decision makers already became aware of the need for action some years ago. Hence, this paper argues, climate change response of the planning system is to a large extent dependent on institutional and political frameworks. Awareness only matters if the institutional setting in which (effective) decisions are made allows actors to make the respective decisions. To provide this framework implicates not only new or revised regulations, laws and instructions from the national government, but also political commitment.

Most recently, local governments were obligated to set-up climate change action plans. This provides a great opportunity for the urban planning system to modify towards a more adaptive governance approach. However, one has to bear in mind that the pro-growth urban development path of HCMC is not likely to change in the near future. A recent economic study revealed HCMC (along with Hanoi) to become one of the world's top two

cities based on projected average yearly GDP growth from 2008-25 (PricewaterhouseCoopers 2009). This perspective gives evidence that adaptation measures must apply to the growth paradigm, otherwise they are not likely to get implemented.

## Acknowledgement

This paper presents preliminary results of the action field urban development of the research project "Integrative Urban and Environmental Planning for the Adaptation of Ho Chi Minh City (HCMC) to Climate Change", as part of the research initiative "Sustainable Development of the Megacities of Tomorrow" of the German Ministry of Education and Research (BMBF). Under the leadership of Brandenburg University of Technology Cottbus (BTU), a trans-disciplinary research team from various Vietnamese and German universities as well as practitioners aim to develop an integrative adaptation planning framework.



## References

- ADB (Asian Development Bank) (2010): *Ho Chi Minh City - Adaptation to Climate Change: Summary Report*. Mandaluyong City.
- ARL (Akademie für Raumforschung und Landesplanung) (2009): *Klimawandel als Aufgabe der Regionalplanung. Positionspapier aus der ARL*, Nr. 81. URL: <http://nbn-resolving.de/urn:nbn:de:0156-00819>, retrieved Oct. 2010). 18 pages.
- Birkmann, J.; Garschagen, M.; Kraas, F.; Quang, N. (2010): *Adaptive urban governance: new challenges for the second generation of urban adaptation strategies to climate change*. In: *Sustainability Science*, Vol. 5. pp.185–206.
- Bulkeley, H.; Betsill, M.M. (2003): *Cities and Climate Change: Urban Sustainability and Global Environmental Governance*. New York.
- Carew-Reid, J. (2009): *Climate Change Adaptation in HCMC Vietnam*. In: *Vietnamese Institute for Urban and Rural Planning and Ministry of Construction: International Symposium for the Hanoi Capital Construction Master Plan to 2030 and Vision to 2050*. pp. 109-135.
- GSO (General Statistics Office of Vietnam) (2010): *Statistical Data* (URL: [http://www.gso.gov.vn/default\\_en.aspx?tabid=491](http://www.gso.gov.vn/default_en.aspx?tabid=491), retrieved Oct. 2010)
- Long Phi, H. (2007): *Climate Change and Urban Flooding in Ho Chi Minh City*. In: *Finisb Environment Institute (SYKE): Proceedings of Third International Conference on Climate and Water*, 3-6 Sept. 2007, Helsinki, pp 194-199
- MoNRE (Ministry of Natural Resources and Environment) (2010): *Outside the scientific community, climate change is largely not understood* (URL: <http://www.mon-re.gov.vn/v35/default.aspx?tabid=675&CatID=59&ID=83291&Code=IECIR83291>, retrieved Oct. 2010)
- MoNRE (Ministry of Natural Resources and Environment); Prime Minister (2008): *National Target Program to Respond to Climate Change* (DECISION No: 158/2008/Q-TTg). Hanoi.
- O'Riordan, T., Jordan, A. (1999): *Institutions, climate change and cultural theory: towards a common analytical framework*. In: *Global Environmental Change* 9 (2). pp. 51-67.
- PricewaterhouseCoopers (2009): *UK Economic Outlook November 2009 - Which are the largest city economies in the world and how might this change by 2025?* (URL: [http://www.pwc.co.uk/pdf/ukeo\\_largest\\_city\\_economies\\_in\\_the\\_world\\_sectionIII.pdf](http://www.pwc.co.uk/pdf/ukeo_largest_city_economies_in_the_world_sectionIII.pdf), retrieved Oct. 2010)
- Storch, H.; Downes, N.; Xuan Thinh, N.; Thamm, H.-P.; Long Phi, H.; Tran Thuc; Hien Thuan, N.T.; Emberger, G.; Goedecke, M.; Welsch, J.; Schmidt, M. (2009): *Adaptation Planning Framework to Climate Change for the Urban Area of Ho Chi Minh City, Vietnam*. In: *World Bank (ed.) (2009): Proceedings of the 5th Urban Research Symposium*, 28-30 June 2009, Marseille. 24 pages.
- Thi Van, T.; Van Trung, L.; Thai Lan, H. (2009): *Application of Thermal Remote Sensing in Study on Surface Temperature Distribution of Ho Chi Minh City*. 7th FIG Regional Conference "Spatial Data Serving People: Land Governance and the Environment – Building the Capacity", 19-22 Oct. 2009, Hanoi.
- Tompkins, E.; Adger, W.N. (2005): *Defining response capacity to enhance climate change policy*. In: *Environmental Sciences and Policy* J (8). pp 562–571.
- UN-Habitat (United Nations Human Settlements Programme) (2009): *Planning Sustainable Cities - Global Report on Human Settlements 2009*. Nairobi.
- Van Trung, L. (2009): *Outline of the Waterlog and Flood Prevention Solutions in Ho Chi Minh City*. Conference proceedings of the 7th FIG Regional Conference "Spatial Data Serving People: Land Governance and the Environment – Building the Capacity" 19-22 Oct. 2009, Hanoi.
- Vietnam News (27 October 2010): *High tides along Sai Gon River flood roads, block shipping*.
- Waibel, Michael (ed.) (2010): *Climate Change and Sustainable Urban Development in Vietnam (Kỷ yếu hội thảo: Biến đổi khí hậu và Phát triển đô thị bền vững tại Việt Nam)*. Proceedings of a Conference organized at Goethe Institute Hanoi, 14-15 September 2010, Hanoi/Vietnam. 378 pages.
- Waibel, Michael (2009a): *Ho Chi Minh City – a Mega-Urban Region in the Making*. In: *Geographische Rundschau International Edition*, Vol. 5, Issue No. 1/2009. pp. 30-38.
- Waibel, M (2009b) *New Consumers as Key Target Groups for Sustainability before the Background of Climate Change in Emerging Economies: The Case of Ho Chi Minh City/Vietnam*. In: *World Bank (ed.) (2009): Proceedings of the 5th Urban Research Symposium*, 28-30 June 2009, Marseille, 14 pages.
- Warner K, Ehrhart C, de Sherbinin A, Adamou S, Chai-Onn T (2009) *In Search of Shelter Mapping the Effects of Climate Change on Human Migration and Displacement*. Care International.
- Webster, D./ McElwee, P. (2009): *Urban Adaptation to Climate Change: Bangkok and Ho Chi Minh City as Test Beds*. In: *World Bank (ed.) (2009): Proceedings of the 5th Urban Research Symposium*, 28-30 June 2009, Marseille, 17 pages.

**Andreas Gravert [gravert@tu-cottbus.de] graduated in Geography at the University of Göttingen and is currently working within the Megacity Research Project Ho Chi Minh City as Research Associate at the Department of Urban Planning, BTU Cottbus, Germany.**



# Whale-Watching Opportunities in Northern Patagonia, Chile

Cesar Guala Catalan, Rodrigo Hucke-Gaete, Jorge Ruiz Troemel

*Abstract: During the last few decades, research into whale watching has gained significant international attention. Despite the negative effects of whale watching described in some studies, there is a body of literature recognising its positive impact including economic and environmental benefits on local communities. Following this trend, some research has examined whale watching in some particular areas of Chile highlighting its value for local communities and the environment. This paper describes the current situation and opportunities of whale watching in northern Patagonia in Chile, one of the most productive and diverse environments throughout south America inhabited by emblematic species such as blue whales (*Baleanoptera musculus*). This paper concludes that whale watching is just emerging and it is still marginal in relation to other activities despite the potential of Patagonia. Considering local operations, different strategies to increase security and quality standards have to be implemented. In addition, a marine and terrestrial planning process should be developed to ensure the natural value of the area.*

**Key Words:** Whale Watching; Sustainable Tourism; Marine and Terrestrial Planning Process; Northern Patagonia

[Manuscript accepted as research note on 2010-10-25]

During the last few decades the tourism industry has become an important sector of global economy. In 2009, tourism and related activities generated 9.2 per cent of Global Domestic Product, employed more than 235 million people and transported ca. 700 million travellers around the world (WTTC, 2010). Chile is not an exception to this trend and since the mid 1990s tourism has become a main economic venture in the country. In 2000 a total of 1,742,407 tourists visited Chile, while in 2007 the number of foreign visitors increased to 2,506,756, leaving USD \$1,803 million to the economy (Government of Chile 2001; 2008). Among these, special interest tourism (SIT) visitors is the dominant group in regards to total number of visitors and suggests that Chile is mainly being pursued by tourists for its natural attractions rather than by traditional attractions such as beaches or snow.

In this regard, there is enough global evidence demonstrating that well managed SIT can contribute in promoting environmental conservation, support sustainable development among local people and strengthen cultural values (WWF, 2001). Among these SIT activities, whale-watching has been one of the most rapidly increasing worldwide. This paper aims to review whale-watching situation among coastal communities of fishermen and indigenous families in Northern Patagonia, Chile.

## Whale-watching: Overview

Different definitions of whale-watching have been provided over the last decades, but Hoyt (2001) provides one of the most recognised and comprehensive definitions: “tours by boat, air or from land, formal or informal, with at least some commercial aspect to see, swim with, and/or listen to any of the

some 83 species of whales, dolphins and porpoises”. Parson et. al. (2005) identify boat based, land and aerial approaches, highlighting that the most common and preferred by the tourists is the first one.

Whale-watching probably emerged during the mid 1950s’ in San Diego (USA), when the first whale-watching

operations were conducted to observe gray whales. Over the following decades, whale-watching spread throughout the world focusing on different kinds of whales and other cetaceans (Hoyt, 2002). Hoyt (2000) reviewed the situation of whale-watching around the world and concludes that a growing number of countries are offering this



kind of tourism. While in 1993 there were 12 countries with whale-watching operations, in 1998 the number of countries was almost 100 (Hoyt, 2000). Despite the fact that most of these operations occur in the northern hemisphere and mainly in the USA (Hoyt, 2001), the industry has expanded to other countries such as Argentina, South Africa, Japan, Norway, New Zealand and Tonga (Orams, 2002).

There is a stream of literature which unfortunately concludes negative impacts of commercial whale-watching on marine environments and cetaceans. These impacts include behavioural changes, such as blow durations, surface time, fluking up and disruption of feeding, among others (Parson et al., 2006). However, there is another stream of literature which demonstrates that whale-watching, well planned and managed, can contribute to conservation and local economies. While in 1998 whale-watching generated about US\$1 billion (Hoyt, 2000), in 2008 the activity generated between US\$1.5-2.1 billion and attracted a range of 12-13 million tourists per year (Hoyt & Iñíguez, 2008; O'Connor et al. 2009). In fact, Hoyt (2001) highlights that "in many places whale-watching provides valuable, sometimes crucial income to a community, with the creation of new jobs and businesses. It helps foster an appreciation of the importance on marine conservation, and provides a ready platform for research. Whale-watching offers communities a sense of identity and considerable pride. In a number of places, it does all of the above, literally transforming a community".

Orams (2002) assesses the economic impact of whale-watching in Tonga (on humpback whales) and suggests enormous opportunities for contributing to local economies; Woods et al. (2003) and Parsons and Woods (2003) analyse the whale-watching industry in Scotland and confirm the contribution of whale-watching to the tourism industry and local economies. In particular, Woods et al. (2003) highlight that in Scottish rural areas whale-watching provides about 12% of the local income.

Whale-watching operations in Chile are still part of an emerging activity. During the early 1990s there were no registers of whale watchers in the country and in 2006 there were only 13,720 tourists reportedly involved in

some kind of whale-watching activity (Hoyt and Iñíguez, 2008). Throughout the country, whale watchers are primarily concentrated in the central-north and south-end areas. In central-north of Chile, fishermen communities offer one day tours to watch bottlenose dolphins and whales in the areas of Chañaral, Carrizalillo and Punta Choros. In the extreme south of the country, whale-watching tours have been mainly implemented by entrepreneurs and tour operators in the Magellan Strait. There are three tour operators which offer three-day tours to navigate in proximity of humpback whales within a Marine Protected Area (Francisco Coloane Marine Park in Carlos III Island).

Despite the fact that whale-watching is mainly concentrated in the above mentioned areas, Chilean northern Patagonia has emerged during the last years as a hotspot with a great potential for this kind of tourism. Ancient rainforests, fjords, archipelagos, unique wildlife, as well as local communities with rich and little known traditions, are part of the area's exceptional characteristics which provides important opportunities to promote whale-watching.

### **Whale-watching in northern Patagonia, Chile**

The area of the Gulf of Corcovado (photo) is one of the most productive and diverse marine environments throughout South America, inhabited by emblematic species such as Peale's (*Lagenorhynchus australis*), Chilean (*Cephalorhynchus eutropia*) and bottlenose dolphins (*Tursiops truncatus*), as well as humpback (*Megaptera novaeangliae*) and minke whales (*Balaenoptera bonaerensis*) and is also home to arguably the largest feeding and nursing ground for blue whales (*Balaenoptera musculus*) in the entire Southern Hemisphere (Hucke-Gaete et al., 2003). It is this diversity of marine life, complemented by striking natural landscapes and rich local culture, which provide important opportunities to promoting community based whale-watching in Northern Patagonia.

Due to the relatively unpolluted waters of the fjords, the great amounts of freshwater runoff, and the low human population density nearby, the Chiloe-Corcovado area is being increasingly sought for use by large industrial activities such as intensive aquacul-

ture (one of Chile's main exporters), fishing (already facing problems due to resource overexploitation) and other industrial projects, all of which represent a potential threat to the adequate functioning and sustainability of the ecosystem. Increases in industrial maritime traffic, marine pollution and habitat loss in riverine/estuarine ecosystems, all pose significant threats if bad practices do not change in the near future.

However, during the past five years whale-watching has emerged as a potential business for national tour operators and has created opportunities for coastal local communities. Hucke-Gaete et al. (2010) identify 11 national tour operators with programmes of one or more days, which include whale-watching in the whole area of the Gulf of Corcovado. In addition, local communities have implemented whale-watching tours in different areas of the Gulf. In the north of Chiloé Island -in the area of Puñihuil- the local community and a fishermen association have organised tours for watching whales, dolphins and penguins. In the south extreme of the same island, in a town called Quellón, there are at least three local fishermen and entrepreneurs promoting tours to watch blue whales and other wildlife. In addition, the local council has become an important actor on this regard, and has organised different events and fairs related to whale-watching in order to attract visitors and consolidate the region as a whale-watching hub in southern Chile (e.g. Fuentes y Heinrich 2007). Further south, in Melinka, there are two local fishermen who offer tours to watch blue and humpback whales in the Gulf. These fishermen also offer several days tours navigating through Las Guaitecas archipelago although not only focused on whale-watching. In this case, the tour includes bird watching and snorkeling. The experience of these fishermen has promoted interest among the local community for implementing whale-watching tours and during the past two years a local entrepreneur has become interested in also implementing this activity with higher quality standards, starting operations during 2010.

Despite the fact that these initiatives contribute in adding value to national tourism supply and provides new opportunities to local communities, a recent research carried out by Hucke et



al. (2010) emphasises that to take advantage of the opportunities arising from whale-watching, several aspects need to be developed. Some of these aspects include market information, quality standards and most importantly, best practices at the local level of operation. The heterogeneity of touristic services, the differences on tourism-related infrastructure and equipment between companies or localities, differences on the human capital (or technical level of tour operators) and stakeholders identified during this research, seem to be the most important gaps. When bettering these aspects, a more competitive SIT could be developed at the international level while implementing best practices. Marketing strategies that allow controlling businesses at the local level and a fair distribution of the generated income, together with implementing an integral ecotouristic development plan point towards the adequate direction.

In particular, Hucke-Gaete et al. (2010) indicate that there is not enough information available on regard to tourist profiles or number of visitors demanding whale-watching tours in the area. This aspect is critical in many respects, including assessing the real contribution of whale-watching to local economies or defining strategies to improve whale-watching operations. In relation to this last feature, the lack of systematised information does not allow evaluating satisfaction level of tourists during the tours and therefore impedes defining strategies related to business management. Another aspect highlighted in the abovementioned report is related to quality in aspects such as vessels characteristics, security standards and best practices for whale-watching. With regard to the vessels used by local entrepreneurs, the report highlights that in several cases the boats used for whale-watching operations are the same boats used for fishing activities. This means that vessels may have not been necessarily adapted for tourism requirements, and therefore may affect tour quality. In addition, security equipment and standards are described in some cases as deficient, highlighting the need of progressing on this regard to ensure safe trips for tourists. The report also emphasises the fact that most of the local supply lacks formal adoption of best practices. The adoption of these practices during tours is relevant to avoid impacts on animals and thus



Whale Watching Area in Northern Patagonia

guarantee sustainability. With the exception of certain local communities which have been trained on this regard mostly by NGOs, the report highlights that the adoption of best practices is not compulsory in most of the local supply.

In consequence, to move forward in whale-watching opportunities arising in northern Patagonia businesses and government require advancing in two ways: (i) adopting strategies where whale-watching can coexist with other activities in a sustainable manner, and at the same time (ii) promote better standards and practices among whale-watching operations at the local level.

### The way forward

In due consideration of the multiple human activities developed in the

study area and the conflicts arising between stakeholders, whale-watching is an as yet underrepresented activity in terms of presence and influence over decision makers, mostly owing to its condition of an emerging activity. To provide an opportunity for sustainable development which could endow with additional income to local communities and Chile in general, there is a need to develop an integrated and effective conservation strategy for this marine ecosystem as a whole, possibly through the creation of one or various Multiple-Use Marine Protected Areas (MUMPA). The MUMPA concept as a cross-cutting issue, would foster the harmonization of current uses bringing stakeholders together to discuss their interests on a participatory process and decide the best way on how to



minimize conflicts, possibly through the creation of a zoning plan as described by Kelleher (1999) and Day (2002).

Under such a scenario, local people would have an opportunity to discuss the value and need to continue their respective activities within the objectives set for the protected area, and also express their concerns, so that the area has the conservation impact that everyone wants, but also accommodates for some of the local uses of biodiversity of the region, including tourism for instance, and also incorporating a major theme such as ecosystem based management.

This MUMPA initiative has proved extremely ambitious in light of the complexity of both the threats faced and of the heterogeneity of interests affecting the area. Stakeholders encompass local inhabitants (poorer than the national average), salmon farmers and artisanal fishermen (facing resource shortages due to overexploitation), among others, together with authorities at various levels. In fact, the proposed protected area overlaps two different Chilean administrative "Regions", which entails the participation of a number of local, "provincial", and federal authorities, each with different interests and representing different constituencies. Even local conservationists have highly disparate views as to how to protect the local environment (ranging from the very radical, to those that are willing to tolerate some level of extractive and other disruptive activities). Interestingly, the highest level of support has been felt from local islanders.

Locals are often keen to capitalize on the potential for ecotourism and this is good news since a well established and sustainable tourism industry could generate a most needed change of attitude towards the marine environment. Local communities also often wish to preserve their natural environment unspoiled from what is sometimes perceived as outsiders eager to rip away the area's resources for their short term gain. However, due to its relative novelty in Chile, the MUMPA concept/proposal has had periodic outbursts of opposition by a range of political actors, NGOs and stakeholders. In such a scenario, Huckle-Gaete et al. (2006) and Huckle-Gaete & Lo Moro (2010) propose elevating stakeholder activity standards (such as the salmon

farming industry, shipping companies, local communities, ecotour operators, the Chilean Navy, and others) using a zoning scheme that harmonizes these activities and thrusts a positive spill-over effect that changes bad-practices currently undertaken. Special Interest Tourism could become the main driver to conserve this remarkable area rich in biodiversity and home to the world's largest animal, the blue whale, while also elevating it to a world-class destination where conservation is effective and takes management seriously, involving all stakeholder considerations in the decisions made.

It is also well known that whale-watching requires the adoption of best practices to guarantee no risks and impact on tourists and animals. Some of these best practices were included in a Fishery Regulation under review by the Chilean Undersecretary of Fisheries (Reglamento Observación Mamíferos, Aves y Reptiles Marinos), where basically most relevant aspects of whale-watching codes of conduct are established, such as vessel speed and the procedure to approach the animals, minimal distances, observation time, some vessel's characteristics and complementary regulations to minimize environmental impacts such as garbage management or impacts on tourists such as vessel equipment and security procedures, as well as crew qualifications. Outreach and educational programmes focused on tourism and conservation issues are an important tool to increase technical and human capabilities and to prevent some bad practices already observed in whale-watching operations elsewhere.

## Conclusion

The natural values of northern Patagonia, in particular the Gulf of Corcovado, offer a remarkable potential for promoting whale-watching activities. Described as a terrestrial and marine biodiversity hotspot, this area is rich in landscapes, wildlife and marine biodiversity. In fact, nearly 40 marine mammal species, including whales and dolphins, have been identified and described in the area. This natural richness represents an important potential for promoting whale-watching in the area, which is confirmed by the number of tour operators and local communities starting to offer tours throughout different areas of the Gulf of Corcovado during the past five years.

Whale-watching supply at the local level has been basically implemented by local entrepreneurs or fishermen. This supply is brand new and is described as basic in terms of quality. Most of the tour operations need to improve infrastructure (such as vessel characteristics) to guarantee good service and security standards for tourists should be put into practice decidedly. Additionally, implementation of best practices that warrant minor impacts on whales and dolphins should be compulsory to assure sustainability for the activity.

Despite the fact that literature describes economical benefits from whale-watching on local revenue, it is not yet possible to approximate this for the emerging activity of tours offered by local communities in the Gulf of Corcovado. The lack of registers does not allow estimating the amount of tourists received and the economic impact of whale-watching on local communities. Future efforts should move forward in at least three directions: sustainability, quality standards and markets.

It is also relevant to define and effectively implement best practices for whale-watching in order to guarantee minimal impact based on sound and local scientific research. These practices ought to include approaching strategies, safe distance to the animals, kind of vessels, engines and propeller protection devices, environmental education and interpretation, for instance.

A second direction is related to quality standards, including tourism equipment and security issues. Local communities necessarily need to consider investment and capacity building in terms of quality when venturing on implementing whale-watching. In the case of infrastructure, it is relevant to advance in guaranteeing adequate vessels. These must be appropriate for whale-watching activities, and at the same time provide high-security standards to tourists. In addition, a complete training programme must be carried out to develop skills in several issues, including overseeing management, quality service, as well as tour operations based on best practices, interpretation techniques and environmental education, among others.

Developing tours and programmes must be related to markets. Since there is no systematised information in the cases described here, it is impractic-



cable to identify markets demanding whale-watching in the area. Thus, establishing a systematised information platform will be useful for estimating who demands whale-watching tours in the area and at the same time define marketing strategies.

Finally, to guarantee a sustainable ecotourism in the area it is not only necessary to regulate whale-watching operations and protect whales and dolphins, but also the other activities occurring in the area, especially those more intensive and/or polluting in order to maintain a healthy and functional ecosystem through an integral conservation plan under a legal figure such as a Multiple Use Marine Protected Area. Because of the highly dynamic characteristics of marine ecosystems, research and monitoring data must be an important aspect on the future management and administration of the area, in order to accurately assess habitat use predictability and enhance the chance to observe target species such as blue and humpback whales. Research on key ecological aspects and monitor the impacts of activities developed in the area must be also be a priority within the area's management plan. It is worthwhile noting that for attaining such conservation objectives the consensus, participation and support of local communities, stakeholders and authorities is essential.

## References

Day, J. (2002). Zoning - lessons from the Great Barrier Reef Marine Park. *Ocean & Coastal Management* 45: 139-156.

Fuentes M. & S. Heinrich. (2007). Technical Report: Toninas en el sur del archipiélago de Chiloé, Chile. Ecolo-

gía de Conservación del Delfín Chileno y Delfín Austral. Tourism Department, Municipalidad de Quellón. 14pp

Gobierno de Chile, & Servicio Nacional de Turismo. (2001). *Comportamiento del turismo receptivo 2001*. Retrieved 28/07/10, 2010, from <http://www.sernatur.cl/institucional/archivos/documentos-estudios/turismo-receptivo/comportamiento-2001.pdf>

Gobierno de Chile, & Servicio Nacional de Turismo. (2008). *Comportamiento del turismo receptivo 2008*. Retrieved 28/07/10, 2010, from <http://www.sernatur.cl/institucional/archivos/documentos-estudios/turismo-receptivo/COMPORTAMIENTO-2008.pdf>

Hoyt, E. 2000. *Whale watching 2000: Worldwide tourism numbers, expenditures and expanding socio-economic benefits*. Report from the IFAW, USA. 36 pp

Hoyt, E. 2001. *Whale Watching 2001: Worldwide Tourism Numbers, Expenditure, and Expanding Socioeconomic Benefits*. International Fund for Animal Welfare, Yarmouth Port, MA, USA. 159 pp

Hoyt, E. 2002. "Whale Watching". In *Encyclopedia of Marine Mammals* (Perrin, W.F., B. Würsig and J.G.M. Thewissen, eds.) Academic Press, San Diego, CA, 1305-1310

Hoyt, E. e Iñiguez, M. 2008. *Estado del Aristamiento de Cetáceos en América Latina*. WDCC, Chippenham, UK; IFAW, East Falmouth, EE.UU.; y Global Ocean, Londres

Hucke-Gaete, R., L.P. Osman, C.A. Moreno, K.P. Findlay & D.K. Ljungblad (2003). Discovery of a blue whale feeding and nursing ground in southern Chile. *Proc. R. Soc. Lond. Ser. B (Suppl.) Biology Letters* 271: 170-S173.

Hucke-Gaete, R., F. Viddi & M. Bello (2006). *Marine Conservation in Southern Chile: The importance of the Chiloe-Corcorado region for blue whales, biological diversity and sustainable development*. Centro Ballena Azul (CBA). Imprenta América. ~109 pp.

Hucke-Gaete, R., R. Álvarez, M. Navarro, J. Ruiz, P. Lo Moro y A. Furiás (2010). *Investigación para Desarrollo de Área Marina Costera Protegida Chiloé-Palena-Guaitecas. Informe Final de estudio financiado por FNDP - BID TURISMO Cód. BIP N° 30040215-0, Gobierno Regional de Los Lagos. Unidad técnica mandante: CONAMA. Ejecutado por Universidad Austral de Chile*. 786 pp. [Disponible en [www.conama.cl](http://www.conama.cl)].

Hucke-Gaete, R. y P. Lo Moro (eds.) (2010). *CONSERVANDO EL MAR DE CHILOÉ, PALENA*

Y GUAITECAS. *Síntesis del estudio "Investigación para el desarrollo de Área Marina Costera Protegida Chiloé, Palena y Guaitecas", ejecutado por la Universidad Austral de Chile, mandatado por Conama Región de Los Lagos y financiado por el Gobierno Regional de Los Lagos, Chile, a través del Fondo Nacional de Desarrollo Regional (Código BIP #30040215-0)*. Imprenta América. ~320 pp.

Kelleher, G. (1999). *Guidelines for Marine Protected Areas*. IUCN, Gland, Switzerland and Cambridge, UK.

O'Connor, S., R. Campbell, H. Cortez, & T. Knowles (2009). *Whale Watching Worldwide: tourism numbers, expenditures and expanding economic benefits, a special report from the International Fund for Animal Welfare*, Yarmouth MA, USA, prepared by Economists at Large.

Orams, M.B. 2002 *Humpback whales in Tonga: An economic resource for tourism*. *Coastal Management* 30, 361-380.

Parsons, E.C.M. and Woods-Ballard, A. (2003). Acceptance of voluntary whale watching codes of conduct in West Scotland: The effectiveness of governmental versus industry-led guidelines. *Current Issues in Tourism* 6 (2), 172-182

Parsons, E.C.M., Levandowski, J. and Lück, M. (2005). Recent advances in whalewatching research: 2004-2005. *Tourism in Marine Environments*, 2(2), 119-132

Parsons, E.C.M., Fortuna, C.M. Fortuna, Ritter, F., Rose, N.A., Simmonds, M.P., Weinrich, M., Williams, R. and Panigada S. 2006. Glossary of whalewatching terms. *Journal of Cetacean Research and Management* 8 (Suppl.), 249-251

Woods-Ballard, A., Parsons, E.C.M., Hughes, A.J., Vealander, K.A., Ladle, R.J. and Warburton, C.A. (2003). The sustainability of whale-watching in Scotland. *Journal of Sustainable Tourism* 11, 40-55.

World Travel and Tourism Council. (2010). *Travel and tourism economic impact*. Retrieved 28/07/09, 2009, from [http://www.wttc.org/bin/pdf/original\\_pdf\\_file/2010\\_exec\\_summary\\_final.pdf](http://www.wttc.org/bin/pdf/original_pdf_file/2010_exec_summary_final.pdf)

Word Wildlife Fund (2001). *Guidelines for community-based ecotourism development*. Ledbury, UK.

Cesar Guala Catalan [cesar.guala@vuw.ac.nz] is a Tourism business manager and MsC in Rural Development dedicated to tourism and local development. Currently he is doing his PhD in Tourism Management at Victoria University of Wellington.

Dr. Rodrigo Hucke-Gaete [rhucke@uach.cl] is a Marine Biologist working as Professor at Universidad Austral de Chile. He is also proud Director of a small Chilean NGO, The Blue Whale Center ([www.ballenazul.org](http://www.ballenazul.org)) and the International Whaling Commission's Scientific Committee.

Jorge Ruiz Troemel [jorge.ruiz@ballenazul.org] is a veterinarian dedicated to wildlife conservation and eco-tourism development. He works at the NGO Blue Whale Center and his research interests range from the conservation of birds, whales and the sustainability of wildlife related tourism.



# Pacific Populations in the First Half of the 21st Century

Richard Bedford

In June 2010, the Statistics Programme in the Secretariat of the Pacific Community (SPC) estimated the aggregate population of the 22 island countries of the Pacific to be just under 10 million. Just over two-thirds of the Pacific population was living in Papua New Guinea (PNG) (6.75 million). No other country had more than one million inhabitants, although Fiji at just under 850,000 was not far off this number (Table 1). Sixteen of the 22 countries had less than 200,000 inhabitants, and half of these had populations under 25,000.

## Contemporary Pacific populations

There is enormous variability in the sizes of populations in the island countries, just as there is enormous variability in their land areas and resources bases. Papua New Guinea has 86 percent of the region's land area and is significantly larger than New Zealand (Table 1). New Zealand's 270,500 km<sup>2</sup> of land is equivalent to 58 percent of the area of PNG, while its population of 4.37 million in June 2010 was the equivalent of 65 percent of PNG's estimated 6.75 million at that time (Table 1). Just over half of the Pacific countries (12 of the 22) have less than 500 km<sup>2</sup> of land area and 8 of these have less than 250 km<sup>2</sup> of land (Table 1).

The small aggregated land areas are spread over many islands in most countries. The low-lying coral islands that comprise the Pacific's atolls and reef islands are the region's most vulnerable environments when it comes to considering some of the long-term impacts of climate change – their shallow fresh water lenses are particularly prone to increasing salinisation as a result of more frequent storm surges and higher tides ('king tides'), as well as low and erratic rainfall and prolonged drought (Photo 1).

## Urbanisation

Another dimension to the enormous diversity amongst Pacific countries is the distribution of their populations across rural and urban places (Table 1). At the time of the last population census in New Zealand in March 2006, 85% of the residents were living in urban places with 1,000 or more inhabitants. In the Pacific Islands less than a quarter of the 9.85 million residents

were living in towns and cities. This 'average' for urbanisation in the Pacific is strongly influenced by the very low level of urban residence in PNG (only 13% at the time of their last census in 2000). In fact, several Pacific countries are more highly urbanised than the New Zealand population, especially in the northern Pacific or Micronesia (Table 1). Guam, with its large American military presence has 93% of its residents living in town, while Nauru has everybody living in and around its former phosphate mining town. The Northern Mariana Islands (90%), Palau (77%) Cook Islands (72%), Marshall Islands (65%), and New Caledonia (63%) are also highly urbanised, while Fiji (51%), French Polynesia (51%) and American Samoa (50%) have at least half their populations living in urban places (Table 1).

During 2010 the share of the world's total population living in towns and cities passed 50% for the first time in human history. Ten of the Pacific states had reached or passed this milestone by 2010, and two more were very close to reaching it (Tuvalu and Kiribati) (Table 2). While over three-quarters of the residents of Papua New Guinea (87%), Solomon Islands (84%), Samoa (79%), Federated States of Micronesia (78%), Tonga (77%) and Vanuatu (76%) are still rural-resident, the pace of urbanisation has accelerated in all countries in recent years (Photos 2 and 3). Urban populations in Vanuatu and the Solomon Islands are growing at more than 4% per annum, compared with growth rates of 2.0-2.5% per annum in their rural populations. This is a common pattern throughout the region – most countries have higher annual growth rates for their urban populations than is the case for their rural ones.

In three of the countries in the eastern Pacific (Polynesia) that have more than 60 percent of their residents living in villages there are more people living in towns and cities in countries on the Pacific rim (New Zealand, Australia, United States of America and Canada) than in the islands. If you add into the island-based populations for Niue, Samoa and Tonga the tens of thousands of Niueans, Samoans and Tongans living in towns overseas the share of their overall totals that are urban-resident rises to well over 70 percent. Niueans, Samoans and Tongans are not 'rural' people. These countries all have very extensive diaspora populations. The largest diaspora, in terms of its size compared with the island-resident population, is the 22,000 Niueans living overseas compared with the 1,500 residents on the island of Niue.

## Population processes

Another demographic dimension of diversity amongst the Pacific populations that is relevant for this discussion of challenges and opportunities in the future relates to their fertility, mortality and overseas migration rates. Some simple indicators of contemporary Pacific demography are given in Table 2. There are significant variations in total fertility rates (TFR, the average number of children a woman will have during their reproductive ages), ranging from 4.6 in the Solomon Islands to 1.6 in the Northern Mariana Islands. Eight of the Pacific countries have TFRs of 4.0 or more – almost double the current TFR for New Zealand, and well above the TFRs for all of Europe's populations (Table 2).

A useful indicator that is used for mortality is the average life expectancy

Photo 1: A 'king tide', South Tarawa, 2009 Source all Photos: Richard Bedford



of a person at birth in each of the countries. None of the populations have a life expectancy at birth of 80 years, the level for New Zealand's total population around 2009 (Table 2). Ten of the 22 populations have life expectancies in excess of 70 years, and only two (PNG and Nauru) have life expectancies in the mid-50s (Table 2). In general, the Polynesian countries have the higher life expectancies, with somewhat lower ones in Melanesia and Micronesia (Table 2).

In the case of international migration, most countries are experiencing net losses of people overseas (Table 2). The highest rates are in the small island countries of Polynesia and Micronesia, especially those with privileged access to a former colonial power on the Pacific rim (the United States in the cases of the Federated States of Micronesia, the Marshall Islands and the Northern Mariana Islands; New Zealand in the cases of the Cook Islands, Niue, Tokelau, and Samoa). Some countries have very little net out-migration and the most prominent of these are PNG, Solomon Islands and Vanuatu. These three large populations have no significant diasporas – options for entry of their citizens into Australia, New Zealand and the USA are much more restricted than is the case for most other Pacific populations.

As a result of their high fertility and very limited net migration losses, PNG, Solomon Islands and Vanuatu all have rates of population growth in excess of 2.0% per annum. None of the Polynesian populations, and only two of the Micronesian ones, reach this level. The exceptions are Guam (which experiences extensive immigration of military-related personnel from the United States) and Nauru which has no emigration outlets. Most of Polynesia's populations have growth rates of less than 1%, largely as a result of net out-migration.

In terms of population growth rates there are, in effect, three Pacifics: the 'high-growth' populations in the large countries of Melanesia (average annual rate of population growth of 2.0%); the 'medium growth' populations in the small island countries of Micronesia (average annual rate of population growth of 1.5%); and the 'low growth' populations in Polynesia (average annual rate of population growth of 0.7%) (Table 2). In most of the countries the growth in employment opportunities outside of village agri-



Photo 2: Village scene, Espiritu Santo, Vanuatu 2009

culture is much slower than the growth in the size of the labour force.

### The search for job opportunities overseas

One of the greatest challenges that the leaders of Pacific states are facing is the provision of work in towns for their burgeoning youthful populations. Under-employment and unemployment of what is often termed the 'youth bulge' is a growing cause of concern to governments in several

countries, especially PNG, Solomons, Vanuatu and Kiribati. Through the first decade of the 21st century there has been increasing pressure placed on New Zealand and Australia to open up their labour markets to greater immigration from the Pacific. A recurring theme at the annual meeting of Pacific leaders, the Pacific Islands Forum, has been access to employment opportunities in two countries that have major shortages of labour in their primary production sectors, especially agricul-

Region/country	Land area (sqkm)	Population (est. 2010)	Population distribution (%)	
			Rural	Urban
Melanesia	542,370	8,641,900	80	20
Fiji	18,270	847,800	49	51
New Caledonia	18,580	254,500	37	63
Papua New Guinea	462,840	6,745,000	87	13
Solomon Islands	30,400	549,600	84	16
Vanuatu	12,280	245,000	76	24
Micronesia	3,150	547,300	34	66
Federated States (FSM)	700	111,400	78	22
Guam	540	187,100	7	93
Kiribati	810	100,800	56	44
Marshall Islands	180	54,400	35	65
Nauru	20	10,000	0	100
Northern Mariana Islands	460	63,100	10	90
Palau	440	20,500	23	77
Polynesia	7,990	663,960	62	38
American Samoa	200	65,900	50	50
Cook Islands	240	15,500	28	72
French Polynesia	3,520	268,800	49	51
Niue	260	1,500	64	36
Pitcairn Islands	5	60	100	0
Samoa	2,940	183,100	79	21
Tokelau	12	1,200	100	0
Tonga	650	103,400	77	23
Tuvalu	25	11,200	53	47
Wallis and Futuna	140	13,300	100	0
Pacific Islands	553,510	9,853,160	77	23
New Zealand	270,500	4,367,700	15	85

Table 1: Size and distribution of Pacific Island populations, 2010

Source all tables: SPC-SDP



Photo 3: street scene, Vila 2009



Photo 4: Tongan workers in Motueka, 2009

ture (including horticulture and viticulture) in New Zealand, as well as mining in Australia.

The Australian government has never given any special priority to migra-

tion from Pacific countries, including its former colony, PNG. However, in 2009 it began experimenting with a small pilot project to bring in seasonal workers required in the horticulture

and viticulture industries from four countries – Papua New Guinea, Vanuatu, Kiribati, and Tonga. The numbers actually recruited under this Pacific Seasonal Worker Pilot Scheme have been very small to date (less than 500) but this is a significant departure in policy for Australia in response to pressure from Pacific governments.

New Zealand's response has been more generous. In 2007 a managed seasonal work scheme was introduced for the horticulture and viticulture industries which prioritises employees from Pacific countries (see also Jana Prochazkova's contribution in Pacific News 34). Five countries have been supported in their engagement with the scheme (Kiribati, Tuvalu, Samoa, Tonga and Vanuatu) and up to 5,000 work permits were made available in the first year of what is known as the RSE (Recognised Seasonal Employer) work policy. In 2009 the number of permits was increased to 8,000 and by November 2010 over 20,000 permits for work in New Zealand had been issued under the RSE since its inception in April 2007.

The RSE scheme has proved to be very popular with New Zealand employers seeking to resolve chronic seasonal labour shortages. In addition to providing a stable core to the peak workforces required for picking, pruning and packing fruit, the scheme has had a major impact on church attendance

Region/country	Fertility rate per woman	Life expectancy at birth	Cruel net migration rate	Population growth %/year
Melanesia	c. 4,2	c. 60	-0,6	2
Fiji	2,6	65	-7,7	0,5
New Caledonia	2,2	75	4,6	1,5
Papua New Guinea	4,4	54	0	2,1
Solomon Islands	4,6	61	0	2,7
Vanuatu	4	67	0	2,5
Micronesia	c. 3,7	c. 68	-2,4	1,5
Federated States (FSM)	4	68	-14,7	0,4
Guam	2,7	74	13	2,7
Kiribati	3,5	61	-1	1,8
Marshall Islands	4,4	68	-18,4	0,7
Nauru	3,3	56	0	2,1
Northern Mariana Islands	1,6	75	-15,8	-0,1
Palau	2	69	0	0,6
Polynesia	c. 3,2	c. 72	-8,5	0,7
American Samoa	4	73	-7,1	1,2
Cook Islands	2,5	73	-6,3	0,3
French Polynesia	2,2	74	0	1,2
Niue	2,6	72	-28,1	-2,3
Samoa	4,2	73	-16,7	0,3
Tokelau	4,5	69	-16,2	-0,2
Tonga	4,2	70	-16,6	0,3
Tuvalu	3,7	64	-8,8	0,5
Wallis and Futuna	2	74	-13,2	-0,6
Pacific Islands	c. 3,9	c. 65	-1,2	1,9
New Zealand	2,1	80	-3,8	1

Table 2: Demographic rates, Pacific Islands 2010



in many small rural communities (Photos 4 and 5). The scheme is also popular back in the islands – it is the second biggest employer of ni-Vanuatu outside of their own civil service, and a major contributor of remittances to rural communities in the islands.

### Projected population growth

The RSE and PSWPS, while very welcome initiatives, do not have the capacity to do much to assist with providing work for the rapidly increasing numbers of young Pacific islanders who are seeking wage employment, especially in Melanesia. Over the next 40 years the total population of the Pacific islands is projected to almost double again and to exceed 18 million by 2050 (Table 3). PNG's population could exceed 13 million, more than four times larger than it was in 1990 when it was close to the same size as New Zealand's population. While PNG's population is projected to increase by more than 6.4 million between 2010 and 2050, New Zealand's is likely to grow by only 1.4 million. The demographic futures of New Zealand and Australia and their island neighbours to the north will become increasingly divergent as the century progresses.

While the rates of growth will fall for all Pacific populations over the next 40 years, the absolute numbers added to the numbers living in PNG, the Solomons and Vanuatu will increase. In 1990 these three countries accounted for just over 4 million (68%) of the Pacific's 5.9 million. In the 20 years between 1990 and 2010 their combined populations increased by 3.5 million – the equivalent of 88 percent of the region's 3.9 million population increase during the period, and more than the total population of New Zealand in 1990 (Table 3).

Over the next 20 years (to 2030) the population of PNG, Solomons and Vanuatu will grow by a further 3.6 million – the equivalent of 90 percent of the region's 4 million increase between 2010 and 2030. In the 20 years between 2030 and 2050 the populations of these three countries could grow by 3.9 million – the equivalent of 93% of the region's total increase of 4.2 million. If these projections prove to be reasonably reliable, the three coun-

Region/country	Mid-year estimates		Projections (2010)	
	1990	2010	2030	2050
Melanesia	4,986,700	8,641,900	12,431,600	16,475,700
Fiji	739,3	847,8	946,3	1,060,700
New Caledonia	168,8	254,5	323,2	359,4
Papua New Guinea	3,608,000	6,745,000	9,899,600	13,271,100
Solomon Islands	323,3	549,6	876,4	1,245,800
Vanuatu	147,3	245	386,1	538,7
Micronesia	414,3	547,3	675	748,8
Federated States (FSM)	96,3	111,4	121,1	137,6
Guam	133,2	187,1	243,1	267,8
Kiribati	72,3	100,8	137,5	163,3
Marshall Islands	44,7	54,4	62,4	61,2
Nauru	9,4	10	13,7	16,3
Northern Mariana Islands	43,3	63,1	74,6	80,1
Palau	15,1	20,5	22,6	22,5
Polynesia	543,7	663,9	759,5	825,8
American Samoa	46,8	65,9	83,7	98,3
Cook Islands	17,5	15,5	16,3	16
French Polynesia	196,5	268,8	321,8	348,8
Niue	2,3	1,5	1,2	1,3
Samoa	160,5	183,1	197,7	209,7
Tokelau	1,6	1,2	1,2	1,2
Tonga	95,9	103,4	111,7	123
Tuvalu	8,9	11,2	12,5	13,9
Wallis and Futuna	13,7	13,3	13,4	13,6
Pacific Islands	5,944,700	9,853,100	13,866,100	18,050,300
New Zealand	3,410,400	4,367,700	5,200,000	5,800,000

**Table 3: Pacific populations, estimates and projections, 1990-2050**

tries in Melanesia that currently have no significant outlets for emigration, could add more than three times New Zealand's total population in 1990 to the region's population by 2050.

The major migration-related challenge facing Australia and New Zealand in the Pacific region in the next 40 years is not going to be responding to the impact of climate change on low-lying coral atolls and reef islands or the 'drowning' of islands by sea level rise if this occurs. This will be a relatively easy demographic problem to address. A much more difficult one is going to be responding to the changing social and economic conditions in the big island countries of Melanesia. Already these countries are being termed an 'arc of instability' on Australia's eastern border. New Zealand and Australia

are key participants in the regional assistance mission (RAMSI) in the Solomon Islands that is endeavouring to re-establish a viable governance system there. Fiji's several military coups have profoundly disrupted that country's development. PNG and Vanuatu have quite fragmented governments.

### Conclusion

The second half of 20th century saw the extensive migration to the United States from Micronesia and to New Zealand and later Australia and the United States from Polynesia. During the first half of the 21st century it will be Melanesians who are seeking migration outlets, and New Zealand and Australia will be the logical destinations for many of those seeking work and opportunities overseas

**Richard Bedford [rdb@waikato.ac.nz] is Professor of Population Geography at the National Institute for Demographic and Economic Analysis (NIDEA) at the University of Waikato in Hamilton, New Zealand. He has published extensively in the areas of population change, migration and the Pacific Islands.**





Impressions from Celebrations around Hoan Kiem Lake due to Hanoi's 1000th Birthday  
© Michael Waibel 10/2010