

THE CHALLENGES OF THE AGRARIAN TRANSITION
IN SOUTHEAST ASIA

ChATSEA

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**Seaweed: The Nature of a Global Cash Crop
in the Caluya Islands, Philippines**

by

Shannon Arnold

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SEAWEED: THE NATURE OF A GLOBAL CASH CROP IN THE CALUYA ISLANDS, PHILIPPINES

Shannon Arnold

MES, York University

whosgoingmyway@gmail.com

The Ecology Action Centre

2705 Fern Lane, Halifax, NS B3K 4L3

Canada

Abstract

The rapid uptake of seaweed cultivation by smallholder entrepreneurs in the Caluya Islands, Philippines has both transformed rural lives and helped rejuvenate traditional agrarian and fishing livelihoods of people there. While *eucheuma* seaweed is farmed as an aquaculture cash crop, it has not resulted in the same marginalization that has been documented in other communities reliant on export crops such as shrimp. This paper presents ethnographic research conducted between May and September of 2007. Using political ecology theories, I argue that it is the combination of local socio-economic factors with the unique material nature of seaweed that has created a positive impact for the community and allowed it to be integrated beneficially into existing social structures. My research in this area aims to contribute to an understanding of *how* certain market integration relations are produced and *why* particular outcomes lead to marginalization of communities while others, as in this case, have more sustainable and just outcomes.

Keywords

Philippines, aquaculture, political ecology, seaweed, cash-crop

Introduction

The integration of remote places around the world into common markets and the expansion of market based economies is one of the most transformative processes of the global capitalist age. While South East Asia, and the Philippines in particular, have long been part of international trade and related processes of agrarian transition (Kelly 2000; Reid 1993), the degree and speed of integration of remote areas directly into commodity flows and globalised markets is a newer phenomenon.

Rural areas in the Philippines are being integrated into market relations through diverse and varied processes such as the capitalization of agriculture, land titling and privatization, and the commodification of nature and lifestyles. The site of this study, the Caluya Islands, Philippines, offers a glimpse into the contingent and complex nature of market integration experiences, exemplifying that while local developments are increasingly linked to global forces, they are not solely determined by them. Rather, unexpected outcomes often arise as local contexts articulate and assimilate extra-local processes. Because of this, totalizing discourses that either accept market integration as intrinsically beneficial or reject it as completely negative fail to seize the opportunity to fully interrogate and try to understand the relational processes at work.

In the Caluya Islands market integration has taken the form of seaweed cash-cropping. Since the mid-1990s when seaweed aquaculture was first explored here, life on the islands has changed dramatically. While seaweed cultivation is clearly a cash crop and shares characteristics of capitalist market relations, somewhat surprisingly, my research reveals that it does not fit with other documented cases in which export crops have led to marginalization for small communities. In contrast, the expansion of this export crop in Caluya has increased residents' food security, access to new commodities and educational and entrepreneurial opportunities while also resulting in the rejuvenation of rural livelihood options and once damaged ma-

rine ecosystems. While seaweed farming as certainly not solved all the problems in this area, overwhelming community members feel that it has been beneficial and reduced the precarious nature of life there. The analysis of my empirical research seeks to explain why. How is the nature of seaweed as a crop and the local context intertwining to create a beneficial situation where other instances of integration into global markets have had such negative outcomes?

I argue some key conclusions can be drawn about this particular experience of market integration that may help to explain in a broader context why some forms of market integration lead to marginalization and ecosystem degradation in rural communities while others do not. Along with the empirical data presented in this paper my analysis was informed by contrasting forms of market integration on the islands as well as by other examples of seaweed farming in the rural Philippines. After analysis, I propose the following conditions have proven essential in linking market integration to positive outcomes in this case: a degree of sovereignty over choices for individuals, families and communities; the ability of actors to maintain and/or increase flexibility and diversity in their time use and labour choices; and the degree to which market relations govern social reproduction. In this paper, I focus on presenting my empirical to data gathered during research on Caluya Islands in 2007 showing that the aforementioned conditions are able to flourish in Caluya's seaweed farming experience both because of the particular nature of seaweed as a crop and the specific ecosocial relationships at play. A further aim of this paper is to situate my findings in the agrarian transition and political ecology scholarship.

Much of the agrarian change literature has been terrestrially focused with little attention paid to the growing aquacultural sector and its intersections with the topics of shifting land-use changes and livelihood diversification. Export-oriented aquaculture is rapidly spreading, especially in South East Asia, and is being increasingly framed in rural development terms by governments and development agencies. Aqua-

culture, as Barton and Staniford (1998) argue, can no longer be overlooked as a transformative force in rural change. This is certainly true in the Philippines where aquaculture production has more than doubled between 1990 and 2009 with seaweed now accounting for 70 percent of the total production (www.bfar.da.gov.ph). The Caluya Islands are now a major producer of *Eucheuma* seaweed for carrageenan production and export. As fisheries, and concurrently, coastal livelihoods are threatened and declining, aquaculture will continue to expand with countries simultaneously trying to tap into foreign markets and address food security. Ecosocial problems with many aspects of this sector have been widely documented (e.g. Bryceson 2002; Escobar 2006; Rivera et al. 2002; Vandergeest et al 1999), but rapid expansion continues and empirical research can help clarify the myriad ecological and social changes that continue to result. In South East Asia, shrimp farming has been the focus of the majority of critical research on aquaculture. Comparatively little research has focused on plant aquaculture, though it is the second largest global aquaculture product by volume (FAO 2006). My research seeks to address this dearth in the scholarship by focusing on seaweed, the Philippine's largest export aquaculture crop with approximately 150 000 families involved in the sector (Ferrer 2006) and an export value of \$92 million USD (2007 statistic, www.bfar.da.gov.ph).

The following questions animate my research on market integration in the Caluya Islands.¹ How are non-human actors, spatiality, and human relationships mutually constituting market integration changes? How does non-human nature both enable and constrain the

¹ As a 'first look' at the seaweed farming industry in Caluya Islands, my research is focused on exploring at experience at the household and barangay (neighbourhood) level with some contextualization. In such a short study a totally comprehensive look at the historical, political, and economic impact of seaweed in Caluya is not possible. Further research would illuminate these important aspects and I will be returning to work with the community in 2011 to delve deeper into the importance of seaweed to the area.

capitalization of space and production relations? Who has the power to control and construct spaces here? Is market integration bringing more or less external control over community resources, regulation, ecosystem degradation, and social vulnerability? Using the insights gained from ethnographic field work, I concentrate specifically on drawing out the particular 'localized constellations' (to borrow a term from Li, 2002) in process here. Material characteristics of seaweed itself and Caluya as a place interweave with local socioeconomic power and structures, as well as extra-local forces such as global agro-food markets. As remote areas have integrated into global markets, flattening globalization discourse has been critiqued for tending to mute the importance of local social and cultural difference. I would also argue that place-specific non-human nature as a creative force contextualizing market experiences has also been often overlooked. In short nature matters and cannot be flattened by the homogenizing discourse of globalization. To this end, I draw on political ecology literature to inform my analysis of experiences of market integration and agrarian change to help bring together many relational strands. The case of Caluya demonstrates the useful subtleties and complexities of political ecology as a holistic, interdisciplinary approach. In my study, theories of political ecology help to link detailed and local immersion research with an analysis of multiscale processes that keeps both power and materiality as central foci. Ethnographic methods offer rich and varied research data that can help break down stereotypical or totalizing discourses and offer a deeper understanding of market integration experiences.

This paper first outlines some key political ecology concepts that have shaped my research understanding. Next, the paper turns to the people and ecosystems that are at the heart of my ethnographic data as well as presenting a brief contextualization of seaweed in the larger political and economic landscape. The main section of this paper presents empirical data from my field work and, specifically draws out the importance of place, materialism, and the local

diverse economy in understanding why seaweed farming here differs from other cash crop experiences so significantly.

Political Ecology

Political ecology is a wide ranging field and has been reviewed by numerous authors (Goldman 2000; Grossman 1998; Page 2003; Paulson 2005; Robbins 2004; Walker 2005; Zimmerer 2003). Most still point to Blaikie and Brookfield's *Land Degradation and Society* (1987) as offering the first widely used definition of the field: "The phrase 'political ecology' combines concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land-based resources, and also within classes and groups within society itself" (p17). Of the core themes in the political ecology field today, three have shaped my research analysis: the "lively materiality of nature" (Goodman 2001), the relationship between local and extra-local forces, and the centrality of power. Such a framework is useful in understanding how Caluya's socionature² relations have been affected by processes of integration into global, regional, and national markets for seaweed and teasing out a complex range of processes involving farmers, traders, seaweed, global capital, processors and the marine ecosystem.

The environment, political ecologists argue, is more than a "malleable entity molded by human activity; rather, it has significance" (Grossman, quoted in Robbins 2004, p140). Human influences on environments are important to consider, but there also needs to be recognition of the biophysical variables themselves and how they, in turn, shape socionature rela-

tions. In fact, there has been an effort recently to retheorize how 'matter matters' more generally in the critical social sciences and this is reflected also in political ecology (Bakker & Bridge 2006; Castree 1995; Walker 2005). Engaging with materiality is critical in understanding how capital is producing nature in its desired image in Caluya, and conversely, how nature is shaping the opportunities for, and outcomes of, market integration there.

As Grossman (1998) argues, materiality is particularly important for studies about agrarian change. The "environmental rootedness" of agriculture, he contends, has significance for understanding agency in farming, the ability of the state or industry to control labour, patterns of resource use and inequality. Goodman (2001) asserts that, agro-food studies must begin to wrestle with "the liveliness of nature, its relational properties...in the eco-social co-productions of agro-food networks" (p183). In essence, what is the difference that materiality, both biotic (human and non-human) and abiotic, makes? This type of political ecology must take ecology, the interrelations between biotic and abiotic, seriously.

Political ecology also grew out of a desire to critique apolitical ecology and Malthusian view of environmental degradation and is explicit in its insistence that socionatural changes are political processes. Understanding the specific biophysical relationships that are transformed, sustained, or disrupted during accumulation is necessary to understand the conflicts that so often follow environmental change (Sneddon 2007). Recognizing the inevitability of the construction of nature does not also imply "an *acceptance* of the inevitability of *specific* construction - of nature, of body, of self" (Bakker & Bridge 2006, emphasis in original, p19) nor does it suggest that all socionature constructions are inevitable, desirable or just (Robbins 2004). A research agenda that addresses the difference that material differences make helps to refute dominant claims about nature and society. For example, political ecology work on food security and drought have shown that scarcity or supply is seldom the root of the problem, rather

² My research on seaweed reveals that complexes made up of non-humans, such as fish, ocean substrate, weather, salinity, and seaweed are just as multifaceted as the concurrent social networks: the 'natural' is deeply embedded in the 'social' and vice versa. Interrogating the hyphen in socio-natural and its very real effects on actors on each side is the goal. As Castree (1995) argues, it does not make sense to separate the two and the use of the term socionature is an effort to overcome the externalized nature-society dichotomy.

there is an intersection of multiple socio-natural factors such as weather patterns, political decisions, demand, scientific knowledge, economic restructuring of supply, etc (Bakker & Bridge 2006). Indeed, struggles in Caluya are not merely due to finite space, but are about who has the power to control the space available and decide its use value. The movement towards seaweed farming as the central cash based economic strategy in Caluya has had uneven consequences for different actors. I found that often people's relative power in the area is related to their ability to connect to larger networks outside the remote islands. The specificity of the place itself acts as a creative force on the complex interscalar processes at play.

Global, or extra-local flows, are embedded within localized biophysical, political, historical processes that are a dimension of the correlations between places and scales (Gezon & Paulson 2005). The local is not seen as acted upon or as a passive recipient of global markets. Rather, without overexaggerating the relative power of actors, there is a recognition that localized actors engage in ways that have extra-local effects. Studies such as Li's (2002; see also Finnis 2006, Grossman 1998) of cocoa farming show that decisions to enter markets cannot always be understood as outside pressure from landowners, traders, corporations, but can be the initiative of enterprising individuals and families. This has also been the case in Caluya. Seaweed farming was introduced and has spread horizontally through kin relationships and individual entrepreneurship. As well, the specific factors of Caluya's location and social structure have played significant roles in shaping the commodity chain at the regional and national level.

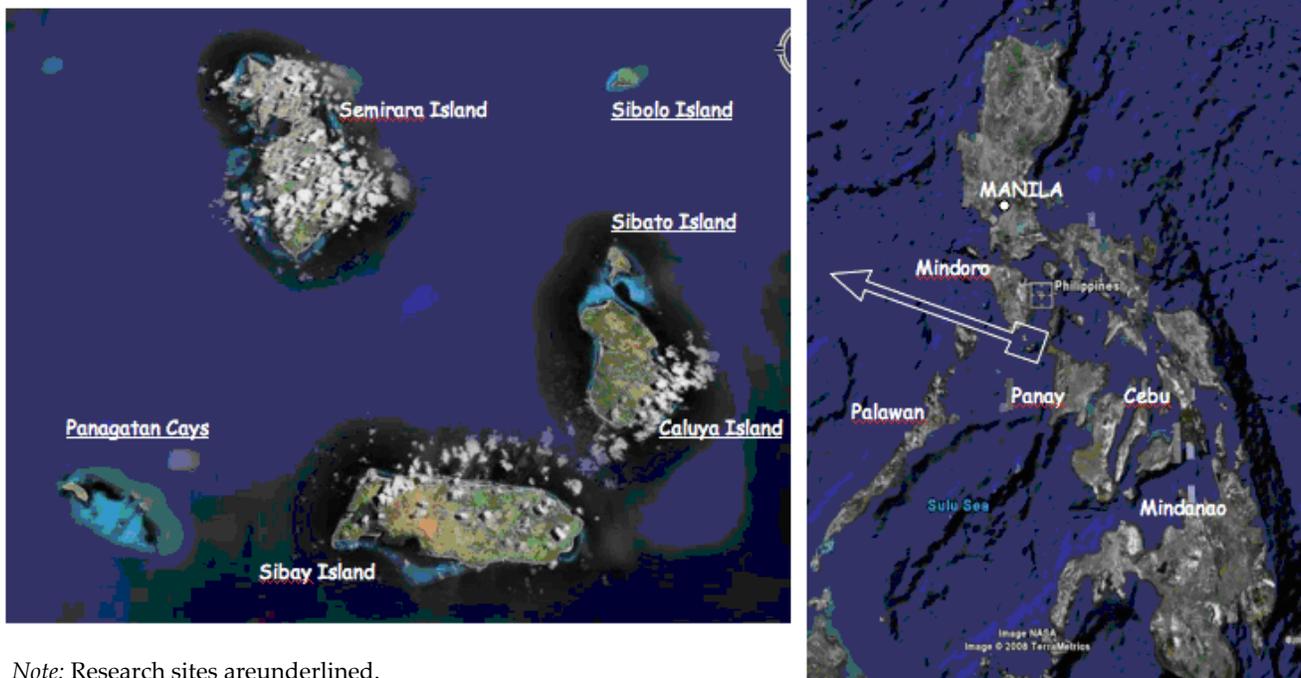
While diverse, political ecology suggests that specific networks of socio-natural relations are by no means unique. Certain relational processes and inequities are repeated in different places. It is by clarifying how these relations are produced, maintained, and changed that claims about the particular may generate broader understandings. Most usefully, about conditions most likely to produce marginaliza-

tion and degradation of socio-ecosystems and, conversely, those that produce sustainable market integration (Hart 2006; Robbins 2004). My research raises the possibility of identifying certain conditions that can link market integration to positive benefits for a community and strives to explore the configurations under which those linkages are most likely to occur.

Methodology

This study focuses on Caluya Municipality, a small group of islands in Antique Province, Philippines (Figure 1). I conducted ethnographic field work on four of the islands: Sibato, Sibolo, Panagatan, and Caluya Islands between May and September of 2007. I conducted semi-structured interviews with 37 seaweed planters ranging from 1.5 hours to multiple visits with some planters and families. All of these were conducted in the language most comfortable for the respondent with the help of my research assistants. All were recorded, aside from six where notes were taken instead. Semi-structured interviews with six local seaweed intermediaries and buyers were also done. As well, I interviewed 2 municipal agriculture officers and spoke to other members of the municipal zoning office and the Mayor. I made an effort to capture a range of opinions and experiences about seaweed cultivation by trying to interview people and families from different backgrounds, social status, gender, income levels. Respondents were contacted through a snowball method and sought out as different themes developed. As well, I travelled to Cebu for a week to interview managers at 3 seaweed/carrageenan processing companies and to tour the facilities. Invaluable as well were my everyday observations, casual conversations, participation in community events, and working with people on their seaweed and land crops. Information was also gleaned from municipal data, interactive mapping, government reports and websites, newspapers and unpublished research at the University of the Philippines in the Visayas.

Figure 1. Location of the Municipality of Caluya, Antique Province, Philippines



Note: Research sites are underlined.

The light blue water indicates shallows and roughly corresponds to the seaweed planting areas.

Research Context: Caluya Islands

Caluya is an island municipality that lies between the islands of Mindoro and Panay, about 4-5 hours by ferry from both of them.³ “The furthest and last town of the province” (Municipal Development Plan), Caluya is not well known outside the area and often gets left out of statistics and maps of the province, despite having a sizable population of more than 20 000 (NSO 2000). The most likely reason people know of Caluya is because the island of Semirara is home to the largest coal mine in South East Asia. Seaweed has not put it on the map, even though Caluya produces a sizeable amount of seaweed relative to its population. It is the main producing area for the Western Visayas region, which, in turn, is the fifth largest producing area in the country. This is not surprising as most people, even in the Philippines, have little exposure to seaweed farming.

Aside from Semirara Island, whose econ-

omy revolves around the coal mine, livelihoods in Caluya include: subsistence farming and fishing; cash cropping of copra, nipa, some vegetables and seaweed; commercial fishing; wage labour for seaweed buyers, fishing boats, and construction; work at the municipal hall on Caluya Island; mat weaving; entrepreneurial businesses such as sari-sari shops, tricycle driving (only on Caluya Island); teaching at the high school, newly opened college or one of the elementary schools; and midwifery. Of course, this is not an exhaustive list and many people supplement their main income with trades such as carpentry, boat building, sewing, etc.

Most people who live in coastal neighbourhoods (*barangay*) of the municipality are involved in the seaweed industry, either growing it full or part time, buying and trading it, or working as labourers. The provincial data show that about 38 per cent of the population are 14 and under. Therefore, the 2500 full time seaweed planters make up about 27 per cent of the adult population outside Semirara.⁴ This high

³ Although the islands are often labeled on maps as Semirara Islands, I will be referring to the group as Caluya Islands as they are more commonly known to residents and in nearby municipalities.

⁴ Not only is Caluya spatially remote, it seems to be ‘statistically’ marginalized. There are very few data sets avail-

official percentage does not include the many families who farm part time or who otherwise gain income from the seaweed industry (boat transport, labour, collecting and drying seaweed that breaks free, buying and trading). It seems as though almost everyone you meet is somehow involved with seaweed and it clearly plays a central role in the islands' economy and socionatural relations. Even children are involved with helping on their family's seaweed plots and collecting their own bags of seaweed that has been washed up on shore and selling it for pesos. My own research concentrated on the main seaweed farming areas: Sibato Island and adjacent Imba Barangay on Caluya Island, Sibolo Island, and the Panagatan Cays (see Figure 1 for general seaweed areas). Of the 120 and 140 households respectively on Sibato and Sibolo, only five to ten households are not deriving their main income from seaweed directly. Panagatan was formerly an uninhabited coral atoll that has been settled since 1986 purely with migrants undertaking seaweed planting, thus the entire population is seaweed farming as their main form of income.

The residents of Sibato and Sibolo islands with approximate populations of 600 and 800 respectively, all share the same kin relations. There are 10 original settler families (some older folks estimate that families came from Palawan and Panay in the mid 19th century) and a few other families who are considered the original inhabitants. 10 surnames account for almost all residents and they own almost all the land on the islands and have complex intermarriage webs of relations.

Inland from the coastal strips of housing on both islands is the 'bukid', a large upland area consisting of forest, planted trees and crops, and coconut farms. Households have access to

able for the area. Data about local production, planters, etc throughout the paper is derived from my own detailed collection of numbers and harvesting details from planters, local buyers, municipalities, and the Cebu processors. Future research planned for 2011 will be focused on providing a more in depth analysis of the overall impact of the seaweed farming industry and its importance to the communities and municipal economy.

plots of land and maintain food crops for consumption or trading, such as corn, cassava, dry rice, melons, squash, cucumber, fruit trees. Many also fish and glean other marine resources for consumption and keep chickens, a pig, or a goat. Sari sari stores run by seaweed buyers also sell canned and dried food items and other sundry. Only Sibato Island has a steady source of fresh water with a community well and pump on the bukid. Both Sibolo and Panagatan have salted wells and fresh water is brought the 1.5 hours by boat from Caluya Island. The only health centre is on Caluya Island and it is often closed or lacking medical supplies. Well kept, tidy houses line the few dirt roads on the islands, ranging from traditional nipa houses, to mixed material houses, to full concrete styles with some commodities such as TVs and radios. Barangay generators provide a few hours of electricity to houses near the centre of the barangay. By all accounts, though still lacking in some basic necessities, the standard of living on the islands has risen dramatically since people here took up seaweed planting in the early 1990s.

The Philippines, Seaweed, and the Global 'Blue Revolution'

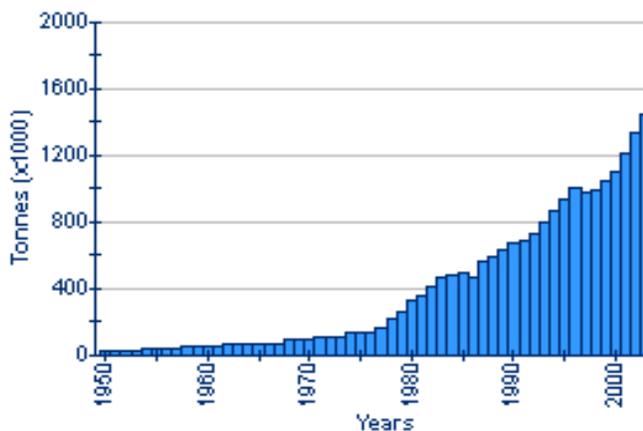
The Philippines is regarded as one of the poorer nations in South East Asia, well behind Malaysia and Thailand in income per capita, and with larger income inequality than Indonesia (Irz et al. 2006). In terms of absolute poverty statistics, the National Statistics Office estimates that 37% of the population lives under the national poverty line.

According to the National Statistics Coordination Board (NSCB), rural areas are disproportionately poor and the situation for coastal dwellers has been exacerbated by the degradation of marine resources (www.nscb.gov.ph). Fish catch by small-scale, municipal fishers has declined since the 1970s as coral reefs and seagrass beds have sustained heavy damage from industrial and tourist developments, mining, deforestation, aquaculture and illegal fishing (Rivera et al. 2002; Primavera 2006; La Vina

2001). While it was once easy for municipal fishers to net an average of 10kg of fish daily, they are now only coming home with 2kg a day (Escobar 2006; Rivera et al. 2002). Similar declines in fish catch were reported by fishers in Caluya, one of the main push factors that lead to an uptake of seaweed cultivation in this previously fishing dominant area. Eighty-five per cent of the Philippines' municipal waters are considered overfished and more than 400 kilometres of the country's coastal areas are now heavily eroded, silted and sedimented (La Vina 2001). This decline in available marine resources as well as income and employment in the fisheries, is especially devastating for the Philippines where 55% of the population lives in coastal areas and at least 3 million people are employed (formally or informally) in the fishing and aquaculture sectors (Rivera et al. 2002).

In the coastal Philippines, global market integration through export aquaculture is increasingly evident as more communities become involved. In order to tackle the persistent poverty of rural peoples and especially coastal populations, the Philippines government has been promoting the development and expansion of high-value, export-oriented aquaculture. This strategy is part of a broader national economic agenda that adheres to a neo-liberal framework, described by Kelly, as "faithful debt-servicing, reduced expenditure, deregulation and export-oriented development" (2000, 39).

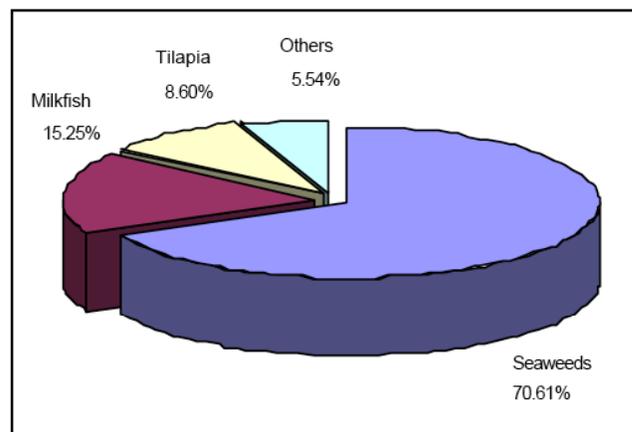
Figure 2. Reported aquaculture production by volume in the Philippines, source FAO (2006)



Seaweed aquaculture is a part of ongoing processes of globalization. Globally, multinational corporations dominate the processing sector and the location of raw seaweed production in the Philippines has followed trends in geographical shifts of labour intensive production from industrial to industrializing countries. In fact, Atlantic Canada was the largest producer of seaweed for export until 1979 when seaweed farming was successfully tested in the Philippines and lower, more flexible labour costs subsidized a cheaper buying price. Harvesters in Canada faced with rising technology costs and short growing seasons could not compete globally and a wholesale move of the colloid industry to buy from tropical waters commenced (Blanchetti-Revelli 1995).

Despite policy fragmentation and jurisdictional power issues, aquaculture production in the Philippines still shows enormous growth (Figure 2). In 2004, it had an output gain of 17.9% compared to gains of only 2.43% in municipal fisheries and 1.86% in commercial fisheries (BAS 2004). Consistent growth in the country's aquaculture industry overall is attributed to the seaweed sector, which contributed 71% of all aquaculture output by volume in 2005 and the second highest marine export value after tuna (BAS 2005) (see Figure 3). This growth at the national level of aquaculture in recent decades reflects a significant and important shift in global marine food production from almost ex-

Figure 3. Per cent share of aquaculture volume by species 2005. Source, Bureau of Agriculture Statistics



clusively capture fisheries 30 years ago to an even split between capture and aquaculture production today (SOFIA, 2008)

Aquaculture has been touted as “The Blue Revolution”- a source of critically needed food security and a way to halt the drastic decline of worldwide marine stocks. In 2006, aquaculture accounted for 32 per cent of the global fishery supply and over 40 per cent of the world’s food fish supply compared to only 8% and 11%, respectively, in 1984 (Ahmed 2006; Barton & Stanifordt 1998). The global industry grew at a rate of 9 per cent a year between 1970-2002 with shrimp farming, in particular, seeing a huge boom in the mid-eighties (Ahmed 2006). Although people throughout Asia have been farming fish and crustaceans for centuries, such extensive forms of aquaculture which have contributed to local food supplies are quickly being supplanted by input intensive, high productivity forms of aquaculture that cater to international markets (Vandergeest et al. 1999). Primavera (2006) has shown that this shift from small-scale, family-owned aquaculture for local and regional consumption to a predominantly corporate-controlled industry producing marine food to be shipped from the global south to the north happened within the space of a decade.

Interestingly, despite continued overall growth, the FAO laments the fact that the Philippines has not maintained its global position in aquaculture, falling from 4th largest producer in 1985 to 12th leading producer today. “In this age of international trade and competition”, it counsels, the Philippine aquaculture industry needs to plan and implement a development and management programme with a global perspective” if it is to continue to bring foreign exchange earnings, provide employment and food security (FAO 2002). The seaweed industry must deserve high praise then, for it has not only continued to grow, by an average of 7% per year between 1998 and 2002, but the Philippines remains globally competitive in this commodity, leading the world in carrageenan seaweed production (FAO 2002).

Seaweed cultivation in the Philippines focuses on *Eucheuma* seaweed. The Philippines is

now the number one producer of *Eucheuma* seaweeds, generating 72% of the world’s supply with approximately 58 000 hectares in cultivation (SIAP 2007). In 2005, the Philippines produced 1.3million MT of this type of seaweed (BAS 2005) and it is *Eucheuma* seaweeds that underpin the US \$10 billion global carrageenan industry (Bryceson 2002). Carrageenan, is an essential component of global agri-food networks tied especially to the rise of processed food products. Carrageenan is a gelling agent that is used as an emulsifier, a binder, or for suspension and stabilization in a range of products. It is added to products either by itself or after being blended with other additives such as bean gums, sugars or calcium carbonate depending on what the product calls for. The list of products that carrageenan is used in is extensive. To name a few:

- processed meat products – chicken nuggets, glazed ham, hotdogs, fish burgers
- dairy – milk, ice cream, chocolate milk, canned coconut milk, mousse
- breads and pastas, cake glazes
- ketchup, dressings and other sauces
- fruit juices and concentrates
- dry and wet pet foods
- toothpaste and shampoos
- beer production
- sugar cane processing
- air freshener gel
- laboratory gels
- textile printing
- medical supplies
- pharmaceutical capsules, cough syrup

While there is now a sizeable academic literature devoted to analyzing and documenting the impacts of export aquaculture. Much of this work focuses on highly socially and ecologically destructive sectors such as shrimp and salmon farming. In terms of promised food security, researchers have found that such aquaculture actually has a net deficit of protein, using more pounds wild fish in the form of feed than pounds of farmed fish produced in the end (Lebel 2002; Stonich & Bailey 2000; EJF 2004; FAO 2006). High use of chemical inputs and antibiot-

ics also characterizes intensive aquaculture, as does salinization of agricultural land and introduction of invasive species. Socionatural relations in intensive aquaculture areas can also be radically changed due to blocked access to coastal resources, the privatization of common lands and waterways, conversion of agricultural land, rural displacement and migration (Stonich & Bailey 2000; Primavera 2006). Human rights abuses, conflicts and violence have also been documented around high-value, export aquaculture operations (Stonich & Bailey 2000).

Evidence for the economic and social benefits of aquaculture is mixed at best. Despite negative experiences with shrimp farming, researchers maintain that there are some benefits accruing to rural populations from aquaculture. While, employment of locals is often limited to low-paying, unskilled jobs, the income generated may help alleviate poverty. Production links both upstream and downstream of aquaculture farms create further employment. Extensive forms of aquaculture, rather than intensive, and farms that focus on herbivorous species, mollusks, and seaweed are less capital and input intensive, lower impact and create fewer barriers to entry for the rural poor (Escobar 2006; Irz 2006).

Thus far, there has been very little critical social science scholarship devoted to such aquaculture production. This is despite the fact that aquatic plants are the second largest global aquaculture product by volume (FAO 2006). Much of this volume is made up of edible seaweeds and represents a vast number of people

involved and large areas of ocean devoted to it globally. The Philippines is one of the world's largest contributors to this volume and now, after the bust of shrimp aquaculture, the Philippines' government, has increasingly started to look towards other export aquaculture such as seaweed cultivation to fulfill its national economic goals. Cultivated for both domestic processing and export, seaweed in the Philippines is part of global agri-food markets and, given the impact it is having on rural areas, it is important to explore whether it, too, follows the same patterns described above in other export aquaculture sectors.

Seaweed Farming in Caluya

Seaweed cultivation as a cash crop differs significantly from other aquacultural production such as shrimp or finfish. Seaweed is grown in the open ocean (there are no enclosing walls or nets as in shrimp or salmon aquaculture) in a depth of water ranging from 1m to 5m. Cuttings of the plant are tied at intervals along lines approximately 15-20 m long with pieces of styrofoam acting as floats. The lines are staked at either end in the sandy bottom and float on top of the water column. The labour cycle of seaweed growing is fairly simple consisting of four main stages: preparing the planting area and lines, tying the seedlings on, maintenance during the 2-3 months of growth, and sun drying for 2-3 days before selling. Caluya is an ideal area for seaweed farming. Its ecosystem offers large shallow areas protected by natural coral reef breakwaters. It is shallow

Figure 4. From left to right: tying seaweed, seaweed lines staked in ocean, drying seaweed



enough for planting easily with minimal swimming, but open enough for considerable wave action and currents, which is essential for nutrient mixing in planted waters. The waters around Caluya also have the salinity needed and there is wild *eucheuma* seaweed found in the area. Seaweed is grown year-round in Caluya with the peak time being the cooler and drier months of October to March.

Household labour division is highly variable and related to ownership of seaweed lines, kinship relations, and other labour duties such as child care or fishing and land farming. Ownership and labour in seaweed is not gender based, neither at the farming level nor further up the local buying and trading chain. Both men and women own lines of seaweed and act as intermediary buyers. Within some families individual adults (and sometimes older children) own and work their own lines, while in other families the ownership and work is done together (the same patterns are reflected in subsistence land farming on the islands). The age range of seaweed farmers I met was from 13 to 75. Labour sharing and swapping is common amongst relatives, especially with land-based seaweed activities such as tying seedlings or rope maintenance. It is also common and acceptable to pay family and friends for labour to ensure there is no indebtedness should swapping be unequal.

Income from seaweed depends on how much initial capital is available to invest for materials and seedlings and how large an area is available to a new farmer. Some people are limited by area while others by capital. Most planters in Caluya have between 100 and 200 lines planted in the peak season (Table 1).

100 lines of seaweed take up about .25 of a hectare. Most people will build up the number of lines they have from their initial investment in materials. Seaweed grows at an astonishing rate compared to other cash crops, ready to harvest at full volume after approximately 2 months by which time it will have tripled in weight. So an initial investment of even 10 lines, for about 2000 pesos can be grown out, cut and replanted to make about 100 lines in as little as 4

Table 1. Number of lines per planter

| Number of lines | Number of planters (%) |
|-----------------|------------------------|
| 10-50 | 8 (22) |
| 50-150 | 15 (41) |
| 151-250 | 6 (16) |
| 251-350 | 1 (2) |
| 351 or more | 6 (16) |

Source: interviews with 36 planters

to 5 months. 100 seaweed lines can be dried and sold for about 15 000 pesos, a 600 percent return on investment. Typically one-third of a farmer's lines will not be dried and sold, but rather kept and used as nursery lines with the grown plants cut back into small seedlings, thus restarting the growing cycle. Many seaweed farmers on the islands started with the very basics like this and built up their lines, easily paying off their initial investment, and any credit or groceries they had taken in the mean time, within 6 months. People coming from very poor situations can even get credit for the initial capital/material investment if they need it. Others had the opportunity to save a much larger sum before they invested in seaweed planting, either from other work or from wedding gifts.

Once a 100 line farm is established, it will cost an average of 500 pesos/month to maintain with some months of the year incurring the bulk of the costs and other months having no maintenance costs. The main expenses incurred once a farm is established are fuel for motor boats, labour costs, and materials replacement. The majority of planters who started out with a paddle boat reported being able to buy a motor if needed, costing between 15 000 and 30 000 pesos, within a year or two.

The average income a 100 line seaweed area will yield is 120 000 pesos/year. In the Western Visayas region this is just above the official annual poverty threshold of 119 000 pesos for a family of five and well above the regional average annual income estimated to be 112 000 pesos (www.nscb.gov.ph). When comparing this

income level from seaweed, it is also important to note that this is their to cash income. Most families' basic food consumption in Caluya comes primarily from their own land crops and fishing, therefore this income is more than sufficient to meet basic needs. All interviewees report an increase in their ability to buy consumer goods and pay for higher education over and above their basic household needs with their seaweed income. A further reflection of higher income levels seaweed planters are enjoying relative to else where in the Western Visayas is the daily wage rate paid for labour help of 150 pesos. Wages in the Western Visayas region are some of the lowest in the country, at an average of 100 pesos/day (Irz et al 2006). 150 pesos a day offered in the seaweed sector is significantly higher.

Access to seaweed areas and the integration of private ownership of seaweed lines with common usage of areas in Caluya is very interesting. Unlike many other types of aquaculture, which takes place in fully privatized ponds, seaweed cultivation takes place in common resource areas. In Caluya, there is no government regulation or allocation of planting areas, although attempts have been made to map and regulate areas through the municipal Department of Agriculture. Essentially, when seaweed cultivation began to spread in the early and mid-nineties, those who wanted to get into the business and had capital to buy equipment

were able claim an area as big as their materials budget allowed them. First come, first served. Generally, the families who entered into seaweed farming in the early years from 1986 to 1992, and who remained in the business through the low prices offered at this time, are the families who still hold the largest areas, some up to 4 hectares. Those families who claimed areas in the mid-1990s seem to have around 1 to 1.5 hectares while those entered the business more recently have between .25 hectares and 1 hectare.

Accessing a seaweed area has become a much more complicated process since most of the areas with good planting conditions have long been taken. Figure 5, below, is an image of the best area to plant off of Sibolo Island. Low tide reveals the lines of seaweed sitting on the seagrass and how tightly packed in the seaweed is. This area, from shore to approximately 150 meters from shore, has about 5000 lines planted during the high growing season.

Access is now for the most part governed by ties with family and friends who already have an area. This is particularly true on Sibato, Sibolo and Caluya Islands where the planters are all residents of the islands or of the neighbouring island. Planters I interviewed or spoke with who had recently started farming seaweed, had all been given an area by a relative who was not using the whole area anymore. Everyone in the ten original families on these islands are related

Figure 5. *Seaweed lines at low tide, Sibolo Island*



in some way through intermarriage, therefore, there is usually an older family member who was one of the first planters. They will hold a large area and may not be planting all of it anymore, but will give it to younger nieces and nephews, etc. This serves as a start up area for newcomers, but expansion is still finite, limited by suitable ocean conditions and there are people waiting for turn over of areas.

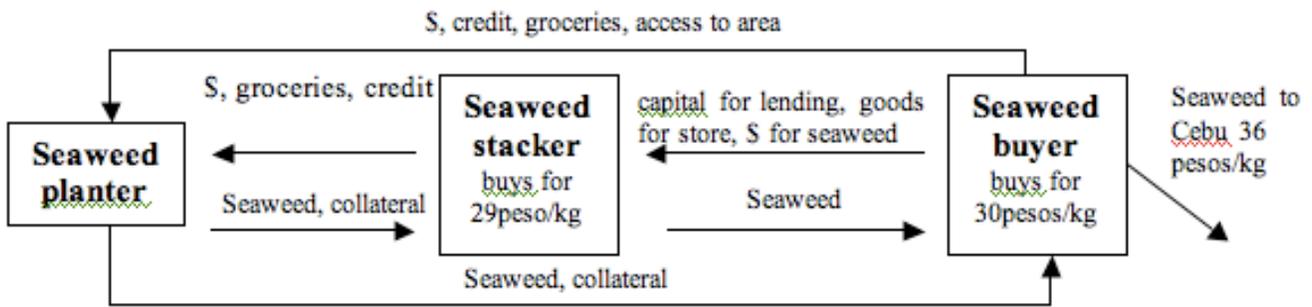
Communities here seem to have successfully integrated private ownership of seaweed lines with communal access to the surrounding areas. It is only the lines themselves that are considered private property and as long as no damage to seaweed occurs traditional activities continue. Customary resource collection from the sea, both for consumption and selling, has been disrupted very little by seaweed farming (the exception, since it is harmful to seaweed production has been community prohibition of dynamite and cyanide fishing). Several activities all take place in and amongst planted seaweed lines. Access is not limited by owning the particular lines nearby. Such activities include: octopus fishing, gill net fishing, and setting fish traps; sea cucumber collection, abalone collection, anemone collection, urchin collection, and ornamental fish collection; seaweed washout collection; boating access lanes; washing of seaweed ropes; and toileting. Access to these activities seems open to all, without restriction by family or status to which areas are open for marine collection. This is true for residents of each island, but there are understandings that such collection on the shores of other islands is restricted to residents. One of the more interesting examples of seaweed being both private and common is how 'washout' is dealt with. 'Washout' is seaweed that has broken off of lines and is floating freely or has washed up on shore. This seaweed is still as valuable as any and can be sold for the same price and, technically, belongs to someone. While some farmers with fewer lines set up nets along one end of their seaweed area to catch some of the washout (as well as to denote their seaweed area), most farmers do not bother to collect washout. If it is still floating within someone's area, it is gener-

ally considered to belong to that person still, but they may have agreements with a less fortunate resident with no seaweed lines that they are allowed to collect it. If it has washed up on shore, it is considered free for all, but is left for poor residents, people who can't plant due to disability or for children. It is seen as a form of income redistribution, much as food sharing practices described below are, and for a few on the islands the access to this 'common' seaweed is their main means of income.

Not only are kin relations the main factor in access to seaweed areas, they are also important in accessing capital since buying and credit practices and done mainly through family connections. This is in contrast with some other seaweed producing areas in the Philippines where the seaweed farming population is often transient or from refugee situations. This rooted social structure, elaborated on below, plays a vital role in shaping the beneficial outcomes of cash cropping here.

The kin-based credit system existing in Caluya is preferred by the farmers over bank loans that the government has made available. The relationship between the planter and the buyer is not just one of buying and trading seaweed, but they are also close relatives. The buyers basically control much of the economy of the islands and the farmers are reliant on them for cash, credit, groceries and other goods. However it is reported to be less exploitative than other market processes on the same islands and elsewhere perhaps due to the underlying reciprocity involved in such a strong kin based community.

Figure 6 shows the movement of seaweed from the farm to the local buyers of seaweed who then sell it to processors in Cebu. A seaweed 'stacker' is an intermediary between the planters and the local buyer, and is usually attached to one particular buyer because of capital loans from them and family loyalty. A seaweed stacker is so called because they buy seaweed over a period of time from 10-30 planters who live in their vicinity (and who are often related) and 'stack' it before moving it to their buyer in a bulk sale. The stackers earn 1 peso/kg

Figure 6. Local Economic Flows

on the sale to local buyers. For example, on Sibato Island there are two buyers of seaweed living on the island, the Bariantos family and the Arelanos family who then sell it to the buyers and processors on Cebu. The Barrientos have 21 stackers throughout the municipality, 7 on Sibato alone. Buyer Joe Barrientos explains, “here, there is a relation system. When one of the stackers has a big family and they are your stacker - you get more volume” (pers comm).

Planters can also sell directly to the buyers, thereby retaining 1 more peso per kilogram, but many choose to sell instead to stackers, because a closer relation facilitates more flexible credit and emergency cash loan options. It is usually through kin references that planters gain access to credit and it is in the form of interest free loans.

Seaweed: A Beneficial Cash Crop?

The previous section described the logistics of seaweed planting in Caluya. As a cash crop, just as bananas and coffee, many would assume that market integration through seaweed farming would follow similar ecosocial patterns associated with such classic export crops. The following sections explore the difference materiality, place and local social structures are playing in Caluya to make the cash crop experience differ.

Contrary to pro-liberalization rhetoric that draws conclusions from national level statistics, research on local level experience with cash crops has often revealed that the supposed amorality of market mechanisms can have very real marginalizing effects on farmers and can result in widespread environmental degrada-

tion (Finnis 2006, Winter 2004). Michael Watts’ (1983) work on Nigerian famine argued that the push for farmers to grow cash crops for export played a significant role in “the rupture of local systems” (14) leading to subsequent resource degradation and decreases in social power. Tania Li’s (2002) more recent work in Sulawesi, reveals that even when the adoption of a cash crop comes from within the community, agrarian class differentiation and land consolidation can still be the result. Political ecology work on deforestation in Central America has made an effort to show that it is not population pressure which at the root of environmental degradation, but rather conditions of market expansion, especially in the banana industry (Vandermeer & Perfecto 1995). As well, cash cropping has been shown to give rise to marginalization through loss of labour time allocation, increased corporate and state control of production processes, and increased food scarcity (Robbins 2004).

Seaweed cultivation is indeed part of the ongoing restructuring of global agro-food networks and the integration of once subsistence-based agricultural communities into export crop markets. As such, it shares some characteristics with other cash crops. Seaweed planters in Caluya are now forced to deal with new market realities such as price fluctuation and global competitiveness in the colloid industry. The future of their livelihoods may be less determined by the quality and sustainable production of supply than by changes in product lines and substitutions at the food processing level. Colloids, such as seaweed’s derivative carrageenan, used in food and non-food production have specific qualities such as gelling strength, dis-

persion, and compatibility with other gums, however there is a degree of substitutability between the various gelling agents. Therefore, companies must negotiate a tenuous balance between technology, innovation, supply, and price to avoid customers switching to a new colloid product. In fact, carrageenan itself rose to prominence after its substitutability for agar was demonstrated during World War II when agar availability from Japan dried up.

Typical of other cash crop commodity chains, the risks associated with the global market for carrageenan are borne disproportionately by the farmers with profits and exit options increasing up the chain. As well, the 'intrusion' of the global into this previously remote place has brought with it commodities such as TVs that are changing traditional beliefs and practices. Most people of Caluya welcome the figurative reduction of their isolation, but many conversations I had with people reveal the bittersweet nature of these changes to them. Many⁵ lament the changes in traditions like wakes, the loss of traditional knowledge by the children, and the increase of vices associated with access to more cash.

Seaweed farming entrepreneurship has obviously not solved all the problems and issues of power on the islands. Some researchers in the Philippines have questioned seaweed cultivation's ability to restructure rural power inequities where other cash crops have failed (Macabuac 2005; Jain 2006). Indeed, in Caluya there still remains income stratification on the islands and social hierarchies. Since the size of seaweed area cultivated ultimately dictates the amount of income derived from seaweed, access to a sufficient plot is paramount to increasing wealth and wealth is linked to social and political power on the islands. As Vandergeest et al. (1999) have shown is also true in shrimp farming, the size of people's seaweed areas in

Caluya are generally linked to preexisting hierarchies and family relationships that continue to influence people's access to plots, as well as their access to land farming areas, water, and capital. Those not as well connected socially have had to work harder to grow their seaweed business or find other entrepreneurial ways to break from those established power structures.

In fact, there is evidence that the entrenched social inequities may be slowly shifting and previously marginalized people on the islands have been able to take advantage of opportunities to improve their standard of living, mobility, and influence due to their increased income from seaweed farming even if they are not the wealthiest farmers. Despite smaller plots some farmers have accomplished this through ensuring quality product and trustworthy business practices. Their improved standard of living is not just evident in the form of commodity acquisitions, but also through the reduction of their remoteness. The area is difficult and expensive to travel in and out of. Previously, people without access to cash were basically restricted to the islands leaving only the wealthiest of families access to off-island connections. Now, more people are able to physically travel to nearby cities and markets bringing back new ideas and values that influence local power structures, making new relationships and networks of power.

This is especially true with the generation now able to attend colleges on Mindoro and Panay Islands, and even in Manila. The number one benefit of seaweed planting that my interviewees mentioned is being able to pay for their children's education. On Sibato and Sibolo where there is only elementary school attending high school on Caluya Island means paying for boarding costs during the week and transportation costs back and forth, a price unattainable for almost all families before seaweed farming. Now the second generation of children from these islands has been able to attend high school on Caluya Island and the first generation has attended college. This change has been even more pronounced on Sibolo Island where the distance to travel to either Caluya or Semirara is

⁵ Since this crop has been taken up in the span of one generation, interestingly, many of these conversations were not with older residents as one may expect, but with residents in the 20s and 30s who see such a difference in their younger siblings, or their children's upbringing and knowledge compared to their own recent childhood.

an hour and a half. The elementary school here only went to grade 4 until 1984 when grade 5/6 was added. Rodney, who grew up on the island, is now the grade 5/6 teacher. When he finished elementary school in 1994, he was the *only* one of his batch of 30-40 kids that went on to high school. Now, he estimates that up to 80% of his class will go onto high school this year. Despite difficulties they still face in attaining an education away from home, graduates such as Rodney are now returning successful to the islands. The first successful university graduate from Sibolo is now raising a family there and has found employment in his engineering field with a land developer. As Li (2002) points out and as the experience here with seaweed cultivation supports, cash crops do not *necessarily* entail class differentiation or entrenchment of inequities.

In fact, this is not the only significant way that seaweed differs from other export crop experiences. The result of this economic shift has been a generally stable market system embed-

Figure 7. *Seaweed*



ded successfully in beneficial social structures. Overwhelmingly, despite many hardships that still exist, residents insist that seaweed farming as a livelihood option has been beneficial for themselves, the community, and the ecology of the islands. It is important to remember throughout this discussion that before seaweed planting became a small-business option for people on Sibato, Sibolo and Imba barangay in the early 1990s very few families had steady access to cash income. The following section describes in more detail how the access to cash through seaweed has led to increased rural livelihood options more broadly, increased food security on the islands, and conservation outcomes for the coral ecosystem. The section also begins to tease out the particular materiality of seaweed and the specific ‘constellation’ of social factors that contextualize seaweed’s beneficial integration in Caluya.

The Difference Seaweed’s Materiality Makes

During typhoons even land farming is difficult because you might get nothing and it takes a long time [to recover], you can recover only the next year... [In seaweed] you can plant again right after the calamity... I’m doing land farming since I’m young in Negros, sugar cane and rice. Seaweed is better. It has no land preparation too; you don’t need to plow or weed it. No expenses in fertilizer and medicine.

– seaweed farmer on Panagatan

The very ecology of seaweed has shaped the nature of the carrageenan commodity chain. Its robustness as a crop allows it to be grown in remote areas with turbulent weather patterns. It thrives in waters that have a fair current and sizeable wave action. While other crops are irreparably damaged by typhoons in the Philippines, seaweed is able to withstand such storms. Though it may break away from the lines the seaweed that washes up on shore and can be collected and replanted with no harm done.

Amilita, a seaweed planter on Sibato, describes this difference:

If I just depend on copra I can't send my children to school. For example [our coconuts] were hit by [Typhoon] Seniang⁶ and until now have no fruits. If there is no seaweed what would I use to send my children to school? [We depend on] seaweed for everything.

The fact that the end product, carrageenan, is derived from dried seaweed increases the robustness of the crop. It can be transported from remote places without major investment in technology to protect the product, as needed when exporting delicate fruits or vegetables. It can also be stored for months in its dried form with no effect on the product quality. This storage ability was an important factor that enabled Filipino entrepreneurs to ride out the global oversupply of the late 1970s and wait for an opportunity to create a domestic processing industry. No other developing country growing seaweed has such an established processing industry, instead exporting the raw product to transnational processors at a much lower price (Bryceson 2002). Because of this, Philippines' seaweed farmers have a more stable market to sell to and a domestic industry that is working with the government in an effort to promote and protect the livelihood.

In some analyses of market integration seaweed's robustness could be characterized as a negative since it has enabled capital to reach into even the remotest places, but for Caluya it offers an option allowing residents to participate in a cash market without having to migrate away from the islands. Residents have long been involved in a variety of market ventures, but due to their remote location and low volumes produced, transportation costs for the goods they could produce like mats and fresh fish meant they were getting low prices. A lack of options in the area forced many people to

migrate away from their families to secure the cash necessary for participation in activities other areas considered basic rights such as schooling and medical care. The ability for families to stay together because of their seaweed business on the islands has benefited many aspects of life and is expanded on below.

Caluya's remoteness has also helped keep the production process in the hands of farmers instead of extension agents, industrial buyers or state regulators. For the most part residents are self-sufficient, but additional support for farmers from agencies after weather or disease calamities would be welcomed only if transparency could be guaranteed. Local politics here is widely criticized as corrupt and, as far as planters are concerned, the less government interference the better. The only extension service to have come to Caluya in recent memory recommended two techniques to increase production, both of which were completely infeasible in the waters of Caluya and were also much too capital intensive to warrant the risk. Planters own knowledge of and creative solutions to the inherent variables of weather and environmental conditions have served them well in dealing with disease outbreaks and storms. Joe, a buyer and former planter on Sibato Island, describes an inventive way, now aided by new technology, to deal with turbulent weather:

A risk in seaweed farming, for example, is typhoons. But people now have radios and others have TV already. [When they hear news about a typhoon] they try this technique to save their seaweeds: they take off the floats so that the seaweed sinks; and if the seaweed sinks the force [of the typhoon] will be weaker, because if it is floating the force is strong. When the strong wind blows, seaweed will be washed out. That is why they let it sink; to reduce pressure. After typhoon it is still there.

Local buyers have also benefited from their 'rootedness' in place. International and Filipino processing companies from other cities do not have the relational connections needed to gain

⁶ In December of 2006 Typhoon Seniang hit this area of the Philippines shortly after the most devastating typhoon in 11 years, Typhoon Durian came through.

trust in the close knit social circumstances. Capitalizing on this, local buyers have been able to manage trade on the islands and direct credit systems in line with traditional rules of redistribution protected somewhat from top-down pressure to reduce price to farmers from the Cebu companies.

Seaweed's Material Constraints on Corporate Control

Along with the remoteness of Caluya as a place, the nature of seaweed as a crop also serves to maintain control in the hands of small-holder entrepreneurs rather than with agro-food corporations as documented in other cash crop chains. Only a modicum of quality control is exerted on seaweed planters compared with other crops such as bananas. Names of planters are marked on the sacs of dried seaweed by stackers to facilitate tracing backwards if seaweed is improperly dried or contains too much foreign matter, both of which reduce the price at the Cebu end of the chain. If this occurs, buyers lose money and they are hesitant to buy from the same planter again. Outside of this, there has been no downloading of processing, packaging and/or sorting to the planter level as in other crops. Again, this is largely due the nature of seaweed itself. Seaweed planters maintain control of their own inputs and are not forced, as in other export crops, to buy expensive seeds and fertilizers from agro-companies each season. Seaweed seedlings are merely cuttings from the larger plant and are always available in the wild or for a small fee from a neighbouring planter. People maintain their own nursery lines, constantly renewing their stocks of seedlings. If a calamity such as disease or a typhoon should wipe out their seedlings, they can easily buy new seedlings from a neighbour or collect 'wash out', seaweed that has come free from lines and washed ashore, to recover. Seaweed planting is so widespread in the Philippines now that should something wipe out Caluya's entire stocks, seedlings could be bought from elsewhere and slowly production would grow again. It seems almost impos-

sible that corporations could succeed in patenting or controlling the seedlings.

The fact that no chemical inputs are needed in seaweed farming also eliminates reliance of planters on suppliers as in other crops. The only nutrients seaweed needs to grow are found in ocean areas with enough water movement and a suitable ecosystem, therefore, no added fertilizers or chemicals are needed. Pesticides would just wash away in the open ocean, so pest control is done by hand when inspecting the ropes. Not only does this negate the usual environmental degradation that accompanies intensive export crop farming, it helps to keep entry level capital costs low. Such farmer control over inputs is essential in keeping barriers to access low in cash crops. In the case of shrimp farming for example, the high cost of entry, relegates most rural poor to wage work on someone else's farm. The low capital and simple technology needed to enter into the market has promoted the uptake of seaweed in a horizontal manner. This has not been a case of outside imposition of an export crop in a rural community. Residents embraced the opportunity to cash crop and spread the knowledge and technology through kin relations.

Corporate control is also constrained by the nature of seaweed's growth pattern. Since seaweed grows in the open ocean, it is far more difficult to privatize, title, and regulate seaweed plots than land plots. Caring for seaweed follows the patterns of tides and weather fluctuations. It cannot be governed by a set time clock of industrial capitalism like some crops that have lent themselves to plantation farming.

Not only has the nature of seaweed put input control squarely in the planters hands, the flexibility of labour needed to work with variations in daily, monthly and seasonal rhythms favours small holder entrepreneurs. A few national buyers/processing companies have experimented with plantation style farms, but found that it was not profitable to hire wage labours with seaweed's particular growth patterns, so cultivation remains individually and family controlled. The flexibility of labour in seaweed farming has led to livelihood strategies

that mix together subsistence food production, other cash, non-cash and reproductive work with the cash-cropping. Some have argued that this type of family cash cropping creates a situation where farmers subsidize capital through self-exploitation (Macabuac 2005). I would argue that this self-exploitation is not limited to agriculture, but is common in many entrepreneurial businesses. Moreover, the alternatives on Caluya to this now more hybridized livelihood - full wage labour or full subsistence - have never been feasible for the vast majority of the population. In the case of Caluya, marginal agricultural land and declining fish stocks makes a subsistence lifestyle extremely difficult and the current offer of full proletarianization, through wage work in a possibly developing tourist industry (this new development on the islands is explored in another forthcoming paper), does not appeal to seaweed planters for a number of reasons, but mainly because it would mean losing control over their time and labour choices. In fact, it is the addition of seaweed cultivation to people's diverse livelihood strategies that has opened up new choices and enabled people to stay on the islands leading to a successful revitalization of the area's agrarian and fishing livelihoods.

Seaweed's Offer of Flexibility

The key to the assimilation of seaweed cultivation as an additional choice rather than a displacement of choice is the flexible labour time allocation that seaweed entrepreneurs have. Seaweed plots take about 3-4 hours a day to maintain (though more or less may be called for at certain times in the growth cycle). This leaves plenty of time for planters to maintain land crops, to fish and glean marine resources, to care for children and the household as well as other activities. The significance of people's ability to maintain control over their labour flexibility and allocation choices is particularly clear when looking at changes to food security the islands have seen in the wake of seaweed farming as a viable livelihood choice.

The Caluya Islands have always experi-

enced precarious food security for a number of reasons. They are located at the meeting place of three seas: the Sulu Sea, the Sibuyan Sea, and the Mindoro Strait. Thus, they experience tumultuous ocean currents and waves as well as the turbulent typhoon weather of the Philippines. This leads to periodic destructions of land crops and regular storms that leave people stranded on their islands. While I was staying on Sibolo Island, we experienced a storm that isolated us on the island for six days. Seas were so rough no boats could get offshore even to fish. This is apparently common every rainy season and often can last for weeks. In fact, during the rainy season ferries through the Caluya Islands are often stopped altogether cutting people off for weeks from Mindoro and Panay Islands. Residents told me that previously, these weather events would lead to food shortages. With no electricity and, therefore, no refrigeration, fresh fish would soon run out and other food items would spoil. People were left to subsist on dried fish and root crops that could be found.

Agricultural land on the islands is sufficient to provide most of people's vegetables and fruit for consumption, but it is too rocky to grow their staple food: rice (Figure 8). The practice of *halili* is how people get their rice on Caluya. Previously this meant, people would go to Mindoro to work on the rice fields there trading their labour for rice supplies. This, as well as migration for other cash work often left their own food crop land untended exacerbating the food insecurity on the islands. As well, in recent decades, illegal fishing, commercial overfishing, and pollution have led to serious declines in their fishing catch and therefore, their main source of protein.

With the uptake of seaweed cultivation, much of this changed. Unlike other cash crops, it is grown in the ocean and, therefore, does not displace food crop land, nor is it a case of a diet staple being exported out of the community. A major shift in labour relations has increased the amount of labour time available for food resources. As mentioned above, one of the most significant changes seaweed farming has

Figure 8. *Some of the more rocky land on Sibato. Planted here with corn.*



brought is the opportunity for people to move permanently home and still earn cash. This has meant more labour available for food crops, fishing, and food gathering and the flexible nature of seaweed planting allows for these other activities to be major parts of the work day. No longer is a member of the family away doing wage work, leaving other members entirely in charge of food and household maintenance. Now, most families share the labour duties of both seaweed planting and food crops.

Food sharing practices on the island also play an important redistributive role. It is common for families and neighbours to give food to each other to help with shortages, with the expectation of reciprocation in the future. More wealthy members of extended families are also expected to share their resources with poorer families and frequently do so. The time available to people during the day is essential for maintaining this food sharing (Figure 9). Community activities usually involve food sharing and these events are important parts of poorer families food strategies. Such events include

birthday parties, wakes (which go on for days), and other family celebrations. These events, especially if hosted by a barangay official, are expected to provide food for anyone who attends, especially children and happen once or twice each week. Larger community food sharing events include barangay and religious fiestas.

Labour time allocation is further improved because of the flexible growth and harvest patterns of seaweed. Seaweed grows year round and can be planted at almost any time. This allows planters to plan their labour schedules according to how much time they want to spend on their seaweed, their land crops, and other activities depending on the rhythm of the seasons and social life. Furthermore, seaweed can be harvested at any time during its growth cycle. Ideally, it is best to let it grow for 1.5 -2 months in terms of quality, but there is no particular time when it is “ripe” like other crops. As this seaweed planter from Caluya Island explains, “It helps a lot because, if you don’t have rice, if you can harvest even just one monoline [of seaweed] you will have rice.” Having seaweed really is like having a savings account; it is basically cash in hand. If there is an emergency, a planter can harvest seedlings only put in the water the day before. They can dry them

Figure 9. Seventh birthday party of Barangay Captain’s son, Sibolo. The entire island waited for their turn to eat. It took about three hours to feed everyone.



and get cash right away. The ability to plan harvest times outside of a strict natural season, helps families plan financially for expensive activities like weddings. For example, many families plant a large batch of line at the end of March so they can harvest in volume in time for college tuition fees in June.

Seaweed may not displace land crops, but how does it integrate with marine resources? As mentioned earlier, though the seaweed lines are privately owned, fishing and marine resource collection happens in and around the lines in an open access system. In fact, according to locals⁷ the seaweed is helping to regenerate the damaged coral ecosystems around the islands. The seaweed areas have now been planted over top of the damaged coral for almost 15 years. This has acted as a protective cover and stopped in-shore dynamite and cyanide fishing. Lines are spaced far enough apart to allow sufficient light in so that in many places corals are visibly coming back and with them small fish and invertebrates. These are also attracted to the seaweed for grazing and to lay their eggs amongst it. In this case, seaweed has served to increase the amount of fish available for consumption and the marine resources available to sell. People discovered that octopuses are particularly attracted to seaweed to lay their eggs and hide at low tide. Planters will intentionally bunch up their seaweed (Figure 10) to attract them since they fetch a high price on the market.

Finally, the cash flow that seaweed has brought to the area has also impacted food security. Along with immediate cash in emergencies, the cash has allowed to people to purchase canned and dried food items, which can be stored lessening the impact of weather related isolation. Commodities such as generators and iceboxes allow fish to be kept for longer and motors, unaffordable previously, allow fisher to go further afield for big fish and lessen labour time needed to travel back and forth from seaweed areas. Cash has also changed how people get their rice supply. Rather than trading labour

Figure 10. *Octopus eggs in seaweed.*



on Mindoro for rice, *halili* is now done through cash. Caluya seaweed farmers send cash at the beginning of the rice season for Mindoro farmers to buy inputs and they are paid back in kind with rice delivered at harvest time, therefore guarantee a supply of their staple food.

Clearly, in contrast to other export crops, seaweed has positively affected food security in Caluya

The Difference the ‘Social’ Makes in Caluya’s Socionature

As the discussion above reveals, it is not easy to split the non-human side of the equation from the social. The environment is not just a receptor of human modification (Zimmerer & Bassett 2003), rather environmental variables interact and interweave with social variables creating unexpected local livelihood shifts and unintended ecological consequences (Castree 1997). It is not only the materiality of seaweed that conditions the success of market integration for a community. Case studies from Mindanao, Philippines and Tanzania show that, while communities there are benefiting from seaweed somewhat, they still find themselves in a precarious position (Bryceson 2002; Jain 2006; Macabuac 2005). I argue that there are certain characteristics of Caluya’s local social system that have, along with the nature of seaweed, constituted the success experienced here. The lack of local elite control of seaweed areas was mentioned earlier, other factors are elaborated below.

⁷ This is corroborated by Mandagi and White’s (2003) study.

The kin based social structure of Caluya has created a credit system guided by relational trust, which is not overly exploitative. Credit and loans are not just between planters and buyer, but also between family and friends. These zero-interest, risk-sharing strategies through loans and gifts allows families to better deal with income variation and economic shocks (Fafchamps & Lund 2003). The relational social structure also makes work easier through labour and knowledge sharing and a traditionally open access system to food resources like fruit trees, root crops and marine collection also facilitates a more even standard of living across the islands. Seaweed farming families in Caluya have access to at least minimal land for food crops and fishing equipment and, therefore have an established 'exit' strategy should seaweed planting become unviable. This is true here since most planters are established residents, unlike the situation in areas of Mindanao where many planters are refugees from conflict situations with no claim to land in their new area. Even on Panagatan, where most planters are not residents, many still have land and assets on their home islands that they maintain through money made from seaweed. The planters and families in the most precarious situations in Caluya are generally those who are newcomers to their planting island and been forced to migrate because of economic hardship elsewhere.

It is useful at this juncture to expand briefly on the different social structures on the Panagatan Cays and the other group of field sites where I spent the majority of my research time, the islands of Sibato, Sibolo and Imba barangay on Caluya Island. It is beyond the scope of this paper to detail all the differences in their experiences of seaweed, but these differences further the understanding of how and when cash cropping brings benefit to communities. Panagatan cays were uninhabited coral atolls before the late 1980s and were one of the earliest places early adopted attempted seaweed farming because of the large, sheltered shallow area between the islands. Initially, seaweed farms were established by a handful of families from

Caluya and Semirara islands who eventually established permanent residence on the islands and now form the core community there. Otherwise, Panagatan is inhabited by migrants from other parts of the Philippines, most notably Cebu and Mindoro, who have moved here specifically to farm seaweed. There are very few services on the island and most residents live in temporary housing keeping permanent residence elsewhere and sending money there. There are enough permanent residents that they now have local political representation and may have a school soon. Despite the differences much of specifics detailed above of seaweed farming, organization of labour and access to areas and credit, and communal access to marine resources hold true for Panagatan. Kin relations govern things much like on the other islands, except that communities are based on island of origin, who people know 'back home', and shared language. Access to areas is governed by whom you know here, but now that there are no more free seaweed planting areas and some long term migrants potentially leaving, Panagatan is the only island where people spoke of possibly selling the access rights to their seaweed plots. Thus far, this has yet to happen, but it is an interesting development in the economy that may occur in the future if there continues to be migrants arriving, especially if the pollution on nearby Semirara, referred to below, continues to grow and seaweed farmers there are displaced. Many migrants here have much more precarious situations than on the other islands of Caluya since they have left untenable situations elsewhere and do not have much margin or solid exit strategy, though they still maintain that they have benefited enormously from farming here. Many of the underlying social structures elaborated below, which are key to redistribution on other islands are also important here and seem to becoming more robust.

Importantly, in Caluya the articulation between capitalist production – commodity production for the market, capital accumulation, and export led growth (Gibson-Graham 2005), and kin-based social reproduction activities has

produced what Gibson-Graham (2005) term a “diverse economy”. By mapping out some of Caluya’s diverse economy, following Gibson-Graham’s method, (Table 2) it is clear that the classically recognized capitalist economic activities of seaweed are contingent on many other non-market activities. Without these diverse economic relations, seaweed cultivation as a market integration strategy may not have such a positive outcome.

The ‘transactions’ column shows the way in which goods, finances, and services flow between actors and are reciprocated and redis-

tributed. Many of these flows are ways that people in Caluya access cash, credit and assistance with financial burdens outside of formal institutions. The ‘labour’ column includes work traditionally left out of economic valuation and demonstrates a range of unpaid labour practices, while the ‘enterprise’ column shows work that is not necessarily under capitalist relations of production. What is clear is that the more capitalistic market relations of seaweed are supported by “a thick mesh” of traditional practices, through which “a network of bonding and bridging relationships creates complex interde-

Table 2. *Diverse Economy of Caluya Islands*

| Transactions | Labour | Enterprise |
|--|--|--|
| <p><i>Alternative Market</i></p> <ul style="list-style-type: none"> ▪ ‘suki’ relations at sari sari store and seaweed buyers ▪ sidewalk vending ▪ seaweed paid for groceries ▪ ‘halili’ system –seaweed farmers get credit, give capital and /or labour to rice farmers in Mindoro in exchange for rice ▪ micro-credit lending ▪ ‘patinga’ – advanced money for unborn animals ▪ barter – fish, crops <p><i>Non-market</i></p> <ul style="list-style-type: none"> ▪ food sharing ▪ childcare sharing ▪ animal and seaweed area caring sharing ▪ care of household ▪ school feeding program ▪ gifts of money to newlyweds ▪ ‘gala’ –sharing of fiesta expenses ▪ donated labour and materials to build school ▪ debt of gratitude ▪ ‘bulos bulos’ – sharing of seaweed area from season to season ▪ free water source built by one family | <p><i>Alternative paid</i></p> <ul style="list-style-type: none"> ▪ self-employed – farmers, fishers, seaweed traders ▪ ‘buligay’ – reciprocal labour sharing on farms ▪ exchange of labour services ▪ in kind payment – land farm help for part of harvest, seaweed labour for part of harvest ▪ tenant seaweed farmers paid with a percentage of harvest ▪ hired labour – 150 per day plus meals <p><i>Unpaid</i></p> <ul style="list-style-type: none"> ▪ voluntary work to help baranagay ▪ help with cooking and preparation for weddings, wakes, and fiestas ▪ family labour on farms and business ▪ household reproduction ▪ church work | <p><i>Non-capitalist</i></p> <ul style="list-style-type: none"> ▪ schools ▪ NGOs (in the past) ▪ fishing enterprise ▪ farms ▪ small-scale producers – carpenters, chainsaw operators, cock breeding, videoke and pool table ▪ tenant farms |

pendencies within and across kin groupings and neighborhoods” (Gibson-Graham 2005, 16) It is these practices, as evidenced in the food security discussion, that are indispensable for redistributing wealth and decreasing inequity on the islands.

Vulnerabilities of the Seaweed Industry in Caluya

The same social kin networks that support the well being of most people in Caluya, can also have negative consequences for others. Family politics and power struggles can constrain farmers’ choices and ability to negotiate prices. Such tightly knit communities can also exclude outsiders and isolate marginalized members as well as place excessive claims on group members and restrictions on individual freedoms (Turner 2007). This has created barriers to entry or expansion for some such that it is increasingly difficult for newcomers to access areas in Caluya. Migration between and into the island groups has no formal mechanism governed on each island by long established traditional ownership rules since the islands are each a distance from the municipal centre on Caluya Island. Consequently, though this has yet to happen in a widespread way here, possible future conflict and consolidation of scarce areas may result. This may also occur in the future if the kin-based risk-sharing structure is unable to absorb large financial crises. In fact, two of the processing company managers I interviewed in Cebu felt that the lack of safety net for planters was the main reason there has been an undersupply of seaweed in the Philippines over the last two seasons. Many planters, they said, did not have the capital resources to restart after major crop losses to disease or weather events. To this end, the Seaweed Industry Association of the Philippines has been working with the government to create insurance schemes for seaweed planters.

Changes in the ecosystem seaweed relies on for nutrients may be one of the largest vulnerabilities seaweed planters face. Seaweed cannot grow in polluted waters; even slight pollution makes it more susceptible to disease. Planters

on Semirara Island, Caluya have already learnt this. As the coal mine there continues to expand and create polluted runoff, planters have been forced to abandon their seaweed. I met many planters from Semirara trying to restart their farms on Panagatan Cays instead. Planters in the rest of Caluya asserted that the pollution from Semirara also affects their seaweed. Over the years, the good seaweed season has shortened and many feel that this is not just due to normal weather patterns. During certain times of the year monsoon winds in the area change direction and instead of blowing from Sibato, Caluya and Sibolo towards Semirara, they blow from Semirara, often carrying with them pollution. A number of planters reported actually being able to see a black coating on their seaweed at this time of the year. This certainly seems a credible explanation since the smoke plumes from the coal mine are visible from Sibato which is two hours away. Most interviewees who had been planting since the start of the seaweed boom trace the beginning of the downturn in seasonal productivity to the late 1990s, which coincides with corporate restructuring and increased mining activity at the Simrara coal mine (www.semiraramining.com and pers. com. with researchers at the University of the Philippines⁸). Further research and historical baseline work would be useful to support this anecdotal evidence, unfortunately access to Semirara is tightly controlled (see footnote) In Barangay San Roque, Mindanao, Macabuac (2005) has documented that the seaweed there has stopped growing in the shallow areas because of increased pollution as well as fresh water run off from monsoon flooding. There has been no recovery for a year and poorer house-

⁸ These researchers had been on Semirara in 1996 assessing the impact of an oil spill off the coast. Among them were experts on mangrove ecosystems, and since the island is usually closed to researchers, they also did some assessment of the environmental damages being sustained by the coal mining operations as well as some of the devastating social marginalization there. Once the company found out, they were told in no uncertain terms to cease inquiries and had to leave the island. Since, they have been ‘informed’ that their research cannot be published.

holds do not have the capital to invest in a boat for planting in deeper waters.

Other seaweed planters in Caluya attribute this loss of productivity to overuse of the nutrients in the water. As Cecilio, a planter on Caluya Island states, “it is like rice fields if you always plant on it... No rest...”. Planters report seeing more disease in recent years as the waters have been slightly warmer than usual. There is no treatment for the main disease ‘ice-ice’ other than vigilance and early harvesting before it ruins a crop. In the future, disease outbreak may become a problem as it has in other cash crops leading to the bust of the boom.

Seaweed though relatively benign environmentally does have effects on its ecosystem. Mandagi and White (2005) show that seaweed farms can affect the amount of light available to corals or seagrass that lie under the lines and as a result of different compounds they emit while growing can push other seaweeds and organisms out of the area. At the same time new species are attracted, which changes the ecosystem dynamics of the area. Planters can also damage coral and other substrates when planting (Primavera 2006), and this was mentioned by a planter in one of the Sibolo Island focus groups I conducted as being a negative effect of seaweed cultivation. As Zimmerer and Bassett (2003) point out socionatural systems are never completely stable and are “subject to change due to the dynamic nature of the environmental world”(4).

It is not just the dynamics of non-human actors that make seaweed cultivation vulnerable, but also the ever-shifting political economic sphere within which it is embedded. It is important to understand the influence that local context has, but relative agency should not be over-exaggerated either. Seaweed planters are still marginalized within broader networks and their decision to take up seaweed planting is made within a narrow set of choices that can change quickly. Extra-local processes exert pressure sometime beyond the control of local residents. In Caluya, the largest threat to seaweed cultivation as a livelihood is the intervention of outside capital and a competing form of

market integration. Though seaweed cultivation has achieved relative socioecological sustainability, planters are not currently protected from powerful investment interests in the tourism industry that are politically connected.

Ironically, the very qualities that make Caluya ideal for seaweed cultivation – shallow, sandy beaches; clear, unpolluted waters; and a coral reef to break the waves – are also considered perfect for sun, sand, and sea tourism. In fact, the characteristics overlap so neatly that the two markets are literally competing for the same stretches of beachfront. Recent land purchases and development in Caluya, led by the Philippines largest land development company in partnership with a few local elite families, seek to completely displace seaweed cultivation in favour of tourism development. This threatens to reverse the positive outcomes achieved there through seaweed cultivation.

Conclusion

Mr R: Of course, [tourism] can only help us in the start.

Mrs A: Tambalang[seaweed] never stops from helping.

Mr R: That is what I said...that if we don't have rice but we have tambalang we can dry it, sell it and use the money to buy rice... If I think of it, I do not agree; [tourism] is bad.

Mrs A: What if they just pay us [for our seaweed area] now then no more, then what?

Mr R: We earn a living here.

Mrs M: ...You can't complain anymore. They[the developers] said in the meeting that if you have a problem you have to complain there and no more murmurs about it after, because there is a meeting already...

Mrs E:... Like, those who have a degree can work, then I said, “how about us that don't have a degree?” “How can we work?”

Mrs O: Just sit down and watch.

Mrs E: They answered that we can do massage...I said that I don't want to do that.

Mrs M: ...People will just follow it.

Mrs O: ...They just follow it...

June 20, 2007. Conversation with seaweed planters on Sibolo Island, Caluya

As described above, there are certainly inequities and vulnerabilities on the islands and seaweed farming has come with its own sets of power relations. Of course, though generalizations are somewhat necessary for analysis and data presentation, the experience of seaweed farming has not been a homogenous one even within the small communities that were the focus of this study. Nonetheless, the overwhelming consensus of residents is that seaweed cash-cropping has been transformational for them, offering access to cash as well as the ability to maintain control over their livelihood choices and land. Is this just a unique and exceptional case or can there be larger lessons drawn from Caluya's struggles and experiences with market integration?

In an effort to answer this, I found it useful to compare the experiences of seaweed farming here and in other places it has been studied and also with other market based work in the same setting. For the communities potentially affected, the tourist development possibility has brought into stark focus the differences in outcomes between owning a seaweed farming business and making cash instead working in tourism. Most Filipino government and academic studies to date on seaweed cultivation frame it as one of a number of equally attractive rural development strategies including tourism, other forms of export oriented aquaculture and cash crops and are focused solely on technical 'how tos' or enumerating success through aggregate poverty statistics. However, such analyses often fail to show that not all market experiences are equal if investigated at the level of people's experiences and perceptions (Paulson & Gezon 2005; Irz et al. 2006). In this type of

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analysis, seaweed cultivation and tourism development may seem equally beneficial to rural communities in the creation of jobs and increase in income level. However, the top-down process and wage labour offers of the tourist development proposal in Caluya reveal a much different form of market integration than seen with seaweed cultivation and is particularly illuminating when drawing out the conditions potentially needed for market integration to be beneficial in such cases.

Tourism development in Caluya, may benefit quality of life if measured only by income (in fact, the daily wage being offered is far below seaweed based income), but if that definition includes a degree of sovereignty over one's labour and resources as well as the ecological well-being of community, answers lie beyond such detached measures. While wage labour offered through tourism would also be a source of cash on the islands, it places control of time and labour choices in the hands of an outside employer. As I outlined in earlier sections the flexibility that seaweed as a crop offers has been essential in the ability of residents to integrate it into existing structures and create a hybrid economy, which buoys up, rather than marginalizes livelihood choices, diversification, and food security. Here the market integration of seaweed has served to *increase* the choices available for livelihood strategies rather than constrain them. And importantly, people have maintained a high degree of sovereignty over how and whether to use these new choices. Seaweed so clearly exemplifies the difference materiality makes to agrarian livelihood choices. Its material nature makes corporate or state control difficult and keeps the entry barrier low. It favours small holders and helps maintain community control over resource use rules and redistribution. This intertwines with an embedded social structure in Caluya, which facilitated the 'organic' spread of the enterprise through kin relations, bottom up. The rejection by the majority of people involved in the seaweed industry in Caluya of tourism as a future option does not reflect a rejection of capitalist intrusion, but rather the specific type of market

economy on offer. The struggle is about control over resource access and livelihood choices.

I would argue that this clarifies and draws out conditions of the experience in Caluya's case that may need to be in place elsewhere for small, agrarian communities to really benefit from market integration: the degree to which market relations govern socio-economic relations; the ability of actors to maintain flexibility and diversity in time, labour, and ecosystem use choices; and the degree of sovereignty over choices available.

Market integration experiences and ecosocial processes are complex and defy totalizing discourses of either the 'pro' or 'anti' globalization variety. Integration into capitalist markets is often portrayed as either apolitical and inherently beneficial for the poor by its supporters or, conversely, as necessarily harmful and marginalizing by its detractors. It is only by teasing out power and relational processes at work, as well as by taking seriously the difference place and materiality make, that claims about the particular can generate broader understanding. For good reason, while social scientists are often wary of prescriptive efforts, Robbins (2004) argues that it is through attention to relational linkages that such claims may be made valid (p142). Indeed, the past tendency by some social science to insist on waiting until socio-ecological consequences are already evident, limits research to an analysis of impacts (Ferguson 2005) and negates their role in struggles for justice and equity. Instead, I hope the empirical evidence and brief analysis of seaweed cash-cropping offered here contributes to political ecology's "dual commitment" both understanding and action" (Gezon & Paulson 2005, p11).⁹

⁹ In 2011 I am returning to Caluya to work with the seaweed farming community to create a clearer picture of the contribution of seaweed farming to the area's economy to strengthen their arguments in favour of protecting seaweed planting as a livelihood and ensure it is not displaced.

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