Social risks in aquaculture

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ABSTRACT

Social risks are challenges by stakeholders to companies' business practices due to real or perceived business impacts on a broad range of issues related to human welfare – for example, working conditions, environmental quality, health or economic opportunity. The consequences may include brand and reputation damage, heightened regulatory pressure, legal action, consumer boycotts and operational stoppages – jeopardizing short- and long-term shareholder value. This definition of social risk can be suitably adapted for aquaculture at the sector, industry, company, farmer group or individual farm level. The definition provides a departure to the concept of origin of risk. To bring social risk analysis to a degree of simplification and system, one should start by defining aquaculture's spheres of social responsibility; identifying the stakeholders to which it has to be responsible and drawing from codes of conduct, codes of practices, ecolabeling and certification schemes, labor standards, food safety standards and environmental standards a list of hazards that could turn into social risks. This review borrows from ecological risk assessment to illustrate the process of social risk estimation, the practical application of which is to predict the types of challenges and their degrees of severity so that an early and cost-effective response can be devised to address them. Another point of difference between social and other risks is that social risks are strategic risks. For strategic risks, in contrast to traditional compliance or hazard risks, risk and opportunity are two sides of the same coin. This makes it necessary and desirable to adopt an integrated approach to strategic risk management. A strategic risk that is anticipated early and mitigated well can be converted into a new market, a competitive advantage, a stock of goodwill or a strategic relationship. An aquaculture risk data bank could be created in which all possible hazards and risks are classified as to their nature, causes, consequences, impacts, severity of impacts, likelihood of occurrence and other characterizations. Among other applications, this could be, a helpful tool for risk analysis and reference for commercial insurers and governments. The review concludes with the proposition that a social risk-free environment that is predicated on socially responsible behaviour promotes sustained growth and development.

INTRODUCTION

A literature search on social risk analysis has indicated the following state of the art: (i) the practice of assessing and managing social risks is common among corporate

bodies, especially multinational corporations; (ii) it is widely used in project risk analysis for which guidelines have been developed (i.e. risk analysis and management for projects) or are being developed (social risk and opportunities tool kit); and (iii) social risk management and protection is a relatively new concept in addressing poverty and welfare issues among the poor and vulnerable by such institutions as the Asian Development Bank (ADB) and the World Bank (WB) (Holzmann, 2001; ADB, 2003).

In terms of risk management, the difference between social risks and technical risks such as pathogens is that the latter focuses on point solutions. These are specific actions to mitigate particular sources or impacts of risk. On the other hand, the approach to social risk, because of its complex origins and impacts, is integrated management (Bekefi, Jenkins and Kytle, 2006). This is probably one of the reasons for the lack of any standardized, widely accepted method, guidance or manual on social risk analysis, apart from those developed for project risk analysis in which social risk is incorporated. There is as yet no formal guideline or agreement issued or arrived at by the Food and Agriculture Organization of the United Nations (FAO), Asia-Pacific Economic Cooperation (APEC) or other organization, on social risk analysis that is comparable to those on food safety, pathogen, ecological and import risks.

DEFINITION OF SOCIAL RISK IN AQUACULTURE

This review takes the perspective of the corporate sector on social risk, i.e. "*Social risks are challenges by stakeholders to companies' business practices over social consequences*" (Kelly, 2005); and, with perceptions factored in, "*Social risks are challenges by stakeholders to companies' business practices due to real or perceived business impacts on a broad range of issues related to human welfare – for example, working conditions, environmental quality, health, or economic opportunity. The consequences may include brand and reputation damage, heightened regulatory pressure, legal action, consumer boycotts, and operational stoppages – jeopardizing short- and long-term shareholder value*" (Bekefi, Jenkins and Kytle, 2006). The emergence of social risk is characterized by four components in combination: an issue, a stakeholder or group of stakeholders, a negative perception about the company and the means to do damage, as illustrated in Box 1.

BOX 1
Components of social risk

- **Issue** – Social and environmental issues like climate change, disease pandemics and mass urbanization.
- **Stakeholder** – In addition to traditional stakeholders, includes civil society organizations, international agencies and even individuals.
- **Means** – Mobilize large (or small but strategic) networks of allies; communication over the Internet; influence public opinion; boycotts, protests; court action, etc.
- **Perception** – Information about companies from official news sources, the Internet, word of mouth and the company itself; can be accurate or inaccurate.

Source: Bekefi, Jenkins and Kytle, 2006.

These essentially similar definitions of social risk made from a corporate viewpoint can be suitably adapted for aquaculture at the sectoral, industry, company, farmer group and individual farm levels as: *Social risks in aquaculture are challenges by society to the practices of the sector, industry, company or farm over the perceived or real impacts of these practices on issues related to human welfare.*

The "polluter pays" principle demonstrates this definition. A farmer compensates society through a tax or a license fee for the cost of repairing damage from his pollution; or he assumes the cost by investing in a system to prevent his operation from causing pollution. Otherwise, the farm could become the target of challenges from the harmed community or from other interest groups that perceive the harm and act on behalf of the community. For instance, the government could impose

a penalty or an activist group could file a legal action.

This definition also suggests three spheres of social responsibility, which for the purpose of this review are classified as internal, external and global. The internal sphere would encompass responsibilities to the farmer, his/her family and the farm workers (as well as the cultured animals!); the external sphere would be responsibility to the community in which it operates, other users of community resources and the most proximate players in the value chain such as suppliers, buyers and processors; and the global sphere would include responsibility to the rest of the stakeholders, especially consumers but also aquaculturists in other countries (Box 2).[1]

BOX 2
Spheres of social responsibility of the aquaculture sector

1. Internal social responsibilities
- farmer
- household
- workers
- cultured animals

2. External social responsibilities
- community stakeholders
- suppliers
- product buyers
- processors
- traders

3. Global social responsibilities
- consumers
- aquaculture industries in other countries
- mass media
- civil society organizations
- activist groups

HAZARD IDENTIFICATION

The broad and usually interlinked social and economic impacts of risks include loss of livelihood, loss of income, loss of market, loss of assets and loss of capacity to work productively. From this perspective, just about any hazard has the potential to translate into a risk that has social impact. For instance, a natural disaster that not only wipes out the crop but also destroys farm assets and erodes the topsoil or silts up the pond will result in loss or severe and prolonged disruption of livelihood for the farmer and unemployment for the workers.

Civil unrest, threats to peace and order and widespread poverty and social inequalities are by themselves social hazards. But these are not results of socially or environmentally irresponsible practices of aquaculture. A farm or a company deciding to locate in an area considered high-risk because of social unrest is expected to make a decision analysis on the basis of an already known hazard that could threaten the viability of its operations. Similarly, farms or enterprises located in an area where risks of a social nature or origin are imminent or suddenly occur would need to weigh management options, i.e. pull out and avoid the risk or stay and initiate risk management actions. This falls under project risk management. But it is relevant – project risk assessments include a social risk assessment, which could be a useful method to adopt for analysis of risks to aquaculture. It is instructive in that an evaluation of social risks to a project includes their impacts on project costs and viability (see Box 3).

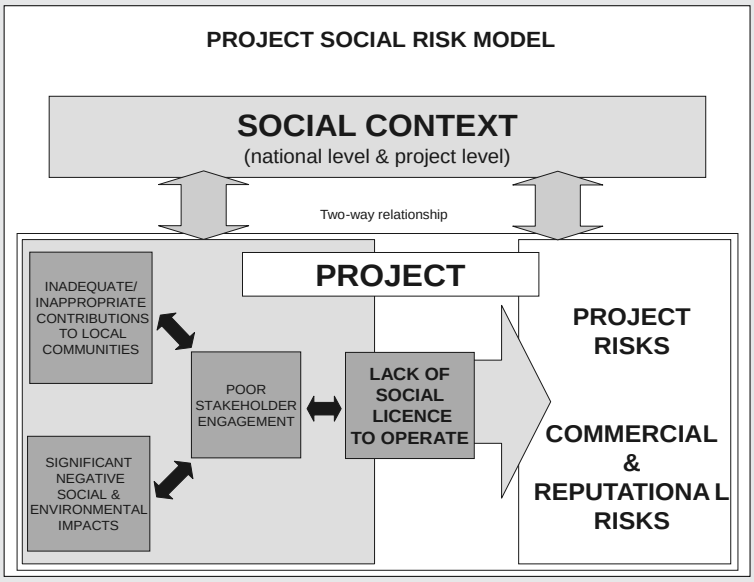
Furthermore, aquaculture or any other economic sector has nothing to do with spawning the most serious hazard of all, bad government, although opportunistic behaviour from the industry could abet it. However, there are actions that farmers and industry can adopt to improve the sector's management and governance, including voluntary or self-management measures and co-management arrangements, forging

[1] In this review, civil society organizations, mass media and activist groups are classified under the category of external responsibilities because their functions are to report, articulate and interpret issues or act as watchdogs on behalf of society in general or of certain groups of stakeholders. A significant portion of the efforts from corporate bodies and industries to manage strategic risks consists of dealing with these groups. The likelihood of a perceived social risk being noticed and broadcast has increased with the proliferation of empowered stakeholders in the global environment, particularly nongovernmental organizations (NGOs) and new forms of media whose own justification for operation depends on their capacity to demonstrate impact (Kelly, 2005).

BOX 3

A model for social risk assessment and management for projects

Projects located and run in unstable environments could inadvertently trigger or sustain violence or become the focus of resentment. Violent conflict represents a threat to life, security, growth and prosperity for affected communities. Conflict also undermines decades of economic development and destroys the social harmony of a locality, country or region. In the context of a project (such as establishing a mining operations), social risks and opportunities are essentially related to a project's local stakeholders and their perceptions and interactions with the project and the organizations delivering it (i.e. the client and their contractors). Social risk can often be visualized as the gap between the boundary of responsibility that these organizations acknowledge and that perceived by their stakeholders. A project social risk assessment model (from Anon., 2006) that could be adapted for aquaculture is illustrated below:



The two-way interactions between a project and the economic, political, socio-cultural and security context in which it is constructed and operated will shape the social risks facing that project: just as a project will be affected by the local and national context, the project itself will also have an impact on this context. To understand and identify social risks, it is important to first understand the context and this two-way relationship. The model outlines how the interactions between a project and its context and stakeholders may generate social risk and opportunities for the project. The diagram provides a basic model of these interactions. In particular, it highlights the link between a lack of "social license to operate" and the generation of risks to the project that would impact on its commercial viability as well as reputation.

alliances with each other as well as with other stakeholders such as the science and technology sector, and organizing into well-run professionalized farmers' associations. Below is a list of social, economic and political hazards to any economic activity:

- civil unrest or civil strife,
- social tension,
- political instability,
- rampant poverty (a proxy to weak government),
- high unemployment (an indicator of horizontal inequality between groups),
- social exclusion (highly defined inequality in access to services and resources),
- tendency of government to solve social conflicts by military action,

- lack of independent judiciary (for dispute resolutions),
- insufficient regulatory system,
- excessive regulation,
- poor or weak governance, and
- economic crisis.

The essence of the definition of social risk – i.e. a challenge by society to a practice or the practices of an entity – precludes these aforementioned situations in risk analysis. This does not mean they should be ignored; their potential impacts can be very severe and they are abetted by improper practices in the sector. Small farmers, who are most vulnerable to these risks, need to be assisted to deal with them.

Another category of hazards consists of those that tend to prevent farmers from adopting, or to make risk-averse ones reluctant to adopt, strategies (such as crop diversification or intensification) or practices (such as an effluent treatment system) that improve their livelihoods or management. Examples are ill-defined property rights, lack of protection of assets, seasonality or unreliability of labour, perception of loss of profitability and a number of those listed above.

Economic hazards that are spawned in the market and industry, such as changes in consumer preferences and tastes, appearance of substitutes, development of competitive products and market volatility, invariably translate to social risks. The most extreme consequence would be the collapse of a commodity industry and closure of farms, resulting in widespread unemployment and the loss of livelihoods or income opportunities for communities and service sectors dependent on the commodity industry. This group of hazards, to be sure, is not perpetrated by practices within the aquaculture sector; but failure to identify them could be attributed to a variety of reasons within the industry or sector, such as lack of foresight, wrong interpretation of market trends or plain lack of capability for market intelligence.

In view of the above discussion, this review will concentrate on hazards that potentially provoke a challenge that has a social impact on a farm, an industry or the sector. Based on the definition and using the spheres of social responsibility as basis for identifying hazards, these would include those listed below (Table 1) as examples.

The above examples of hazards are in fact strategies, practices, facilities or substances the uses of which are meant to improve productivity and profitability. Their improper practice or misuse, whether inadvertent or deliberate, could result in adverse impacts on stakeholders. In the case of technologies (obviously useful by themselves), the introduction of devices that displace workers in a social setting that is poor and where there is excess labour could reflect adversely on the reputation the farm. It could breed resentment from the community because of lost job opportunities (a similar challenge could be provoked by hiring practices). The same applies to technology that requires higher skills, which would displace unskilled or lower workers. A farm or corporate body that neglects to train its workers and finds it more convenient or more efficient to replace them could generate the same response of resentment or direct hostile action from the community.

Worker relations and hiring and purchasing practices pose a social risk to the farm if these were seen by the community as discriminatory, exploitative or opportunistic. There can also be the case of offering "competitive salary structures or wages" to undercut competitors in the labour market. This could result in other sectors losing their work force to the sector or being forced to compete. The latter would have a positive effect on the community's labour market but could result in adverse impacts on other industries and a general feeling of ill will from the business sector towards the aquaculture farm or company. On the other hand, a business strategy such as consolidation, merger or acquisition that is meant to create value for owners and stockholders – and could result in workers being made redundant – cannot be considered as a hazard, notwithstanding this possible consequence.

TABLE 1
Examples of hazards that could turn into social risks

Internal social responsibilities	**Hazards**
People	• Workplace conditions
• Farmer	• Pest and disease control operations
• Household	• Technology that might displace labor
• Workers	• Technology requiring higher skills
Cultured animals	• Feed ingredients (e.g. melamine)
	• Pollution hazards
	• Drugs and chemicals
	• Stocking density
	• Harvest and (for live animals i.e. aquarium fish) transport practices
External social responsibilities	**Hazards**
Community and the environment	• Location of farm
	• Use of common natural resources like water
	• Containment of cultured organisms
	• Waste and effluent disposal systems
	• Employment practices
	• Purchasing practices
	• Predator eradication practices
	• Introductions of species for farming
Suppliers, product buyers, processors, traders	• Buying practices
	• Feed and additives use
	• Drugs and chemicals use
Global social responsibilities	**Hazards**
Consumers	• Feed and additives use
	• Drugs and chemicals use
	• Feeding practices (e.g. use of trashfish)
Aquaculture industries in other countries	• Subsidies
	• Species and production targets
	• Marketing practices

The siting of farms, farm management practices such as effluent treatment and discharge, and other aquaculture practices carry social and environmental impacts to the community. Environmental impacts invariably translate to social impacts. Conflicts can arise because people's access to the shore is blocked by aquaculture installations, salination of crop lands, encroachment or decline in fish catch because of various aquaculture impacts that include fish kills on the wild fishery (FAO, 2006). A classic example of a social hazard is the siting and practices of brackishwater shrimp farms in India, which were cited by activists in their petition to the Supreme Court of India to shut down the sector in 1997 (Patil and Krishnan, 1998).

The use of inputs such as feed, drugs and chemicals is a great source of social hazards, not so much to the farm as to the industry or the sector as a whole. A scare caused by a tainted product invariably gives the industry a bad press potentially resulting in consumer resistance or boycott, importing countries' burning of containers of the product and perhaps change in product or product-supplier preference, all of which lead to loss of market. Loss of market could jeopardize the viability of the sector and the welfare of workers and people dependent on it for a living. The burning or return of shipments of shrimp from Viet Nam found with unacceptable levels of residues of banned drugs also severely impacted on the livelihoods of poor agricultural communities dependent on shrimp aquaculture (MoF/NACA, 2005). The ingestion or exposure of a farmer and/or farm workers to toxic substances from chemicals and drugs because of poor or lack of safety precautions can reach the media and become a serious local or national issue, with the potential of escalating into such challenges as lawsuits, community action against the farm or consumer resistance to the product.

The process of identifying hazards with social consequence includes posing the critical question "What challenges to the industry can be expected from society or

certain stakeholders if something went wrong?" Answers to "What could go wrong?" which should be the first question, can be found or inferred from:

- codes of conduct
- principles of good aquaculture
- codes of practice
- good aquaculture practices
- international agreements
- certification schemes
- ethical and fair trade standards
- animal welfare and free range
- labour standards
- rules and regulations
- International Standards Organization (ISO) standards
- others

These instruments can be used to identify hazards, i.e. to assess what could go wrong. Beyond this, aquaculture needs to know what challenges can be expected from any sector of society if something goes wrong. For example, introduced species that become pests or that carry pathogens have in some cases caused the collapse of fisheries and aquaculture operations, resulting in massive losses in revenue and severe implications for farmers, fishers, post-harvest industries and human health (APEC, 2003). The risk analysis methodologies used for alien or introduced species are well established and the methodology to evaluate their economic, environmental and social impacts have been developed. It is the likely challenges to aquaculture as a whole (or, for example, the ornamental fish industry, if it were the source of the alien) that their impact would incite that need to be identified, assessed and mitigated.

The hazards that could provoke challenges from industries in other countries are those with potential impacts from a country's policies (i.e. subsidies) or a sector's targets (i.e. species and production targets) and marketing practices (e.g. dumping). Subsidies, as well as protectionism, could cause harm to a similar industry and its workers in another country. Over-production and flooding the market thus depressing prices would hurt competitors in poorer areas or countries, and dumping can create a lot of economic backlash on an industry or commodity sector.

A study of shrimp farming in Latin America and the Caribbean by Wurmann, Madrid and Brugger (2004) provides an example with an interesting perspective. The study focused on two sources of competition: producers in importing countries (such as the United States shrimp fishing industry) and producers in other regions, particularly Asia. The study viewed the anti-dumping case in the light of its negative impacts on national shrimp industries. It predicted that after the completion of the exercise (anti-dumping charges and imposition of countervailing tariffs, and countercharges), "things would go back more or less to where they were at the outset, but not before causing disruptions in producing countries, and financial collapse of traders, importers and distributors". It also viewed the Asian competition largely from the expansion of white shrimp production (*Litopenaeus vannamei*) as initially disruptive to the industry in Latin America but concluded that it will compel the latter to become more efficient in the long term. The anti-dumping action probably did not affect the shrimp industries of concerned countries as seriously as the study predicted, but it did create disruptions. On the other hand, there was no challenge based on this issue from Latin America to Asian competitors (particularly those producing *L. vannamei*).

In summary, an action within the aquaculture sector that tarnishes its reputation for social responsibility has the potential to provoke challenges from society. Codes of conduct and practices, certification schemes (especially ecolabeling) and standards of food safety, chemical use and labour are useful guides to identifying hazards that could turn into social risks.

SOCIAL RISK ASSESSMENT

Assessing the likelihood of a hazard turning into a social risk may or may not follow the stepwise release, exposure, consequence and estimation procedure designed for import risk analysis (pathogen risk analysis). Risk assessment of introduction of species would follow exactly the standard procedure up to assessment of its social, environmental and economic consequences. To then assess its social risk, key questions would be:

- What is the likelihood that a challenge is provoked from adversely affected parties or groups taking up their cause?
- What kind of challenge could be expected, from whom or which interest group(s)? and
- What are the likely consequences of a challenge to the aquaculture sector or the industry?

The critical question is what would be the most serious consequence from the challenge? Would it be simply an annoyance, would it breed resentment from the community, would it provoke hostile action such as a blockade against the farm or destruction of its structures and equipment, would it result in loss of market, or would it lead to the closure of a farm or an industry?

A negative report or public criticism in the local or national media from some person or group would at first glance seem a mild reaction that can be responded to by a media release or a public relations campaign. However, this could readily escalate into (a) a greater issue, say, of human rights, environmental irresponsibility or anti-poor, or (b) a suite of interlinked issues that could be more intractable and expensive to respond to, or (c) a class action. For example, what started as public criticism from an environmentalist in India on a single issue – water abstraction – ended in the Supreme Court ordering the closure of brackishwater shrimp aquaculture.

In this connection and in the context of risk analysis, the study of Patil and Krishnan (1998) on the social impacts of shrimp farms in Nellore, Andhra Pradesh illustrates an important step in the process of social risk assessment. They identified and ranked the severity of six social impacts of shrimp farming on 26 villages located adjacent to shrimp farming clusters as perceived or felt by the affected parties. The impacts included blocked access to the beach, salination of well water, salination of agricultural land, difficulty in gathering fodder and fuel wood, unemployment or under employment and poor health. They found that for the 17 fishing villages, blocked access to the beach was a very severe problem, well water salinity a severe problem, crop land salination and underemployment were moderate problems, poor health was problematic and difficulty in gathering fodder and fuel wood a nuisance. The study found no problem or combination of problems that caused a social crisis. It also found that different occupational groupings ranked the problems differently, as illustrated below in Table 2.

The value of this kind of study to risk assessment is the identification and assessment of the impacts and their relative severity, which thus gives an indication of likely consequences and the impacts of a practice. For risk management, it offers government

TABLE 2
Severity ranking of social impacts in fishing and farming villages

Ranked Impacts[1]	Ranked by Fishing Villages	Ranked by Farming Villages
Well water salinity	2	4
Blocked access	1	3
Agricultural land salinity	3	2
Un/under employment	4	5
Poor health	5	6
Fodder & fuel wood	6	1

[1] "1" is most severe.

Source: Patil and Krishnan 1998.

and industry a guideline for addressing the root cause/s of the risks. The study was able to expose the nature of each social impact and determine its magnitude to enable the development of effective legislation and other means to regulate and mitigate shrimp farming impacts. The science-based guidelines became a credible response to the environmental activists' challenges.

Consequence scenario

The complexity of origins, the relationships between risks or among several risks, and the many possible consequences of a social risk make it extremely difficult to establish a social risk consequence scenario, as is sharply illustrated by the Supreme Court of India's order to close the brackishwater shrimp industry. Other challenges such as consumer boycotts and resistance are difficult to assess, although an indication that such challenge might be mounted could be gauged from the severity and visibility of the impact. For example, food poisoning, discovered and widely reported drug residue on shipment and its being burned, mass lay off of workers, massive pollution and massive mortality of cultured and wild fish are unmistakable signals of severity that can catch the industry off guard. On the other hand, importing country actions such as bans, return or destruction of shipment, and trade sanctions are essentially notified and, because of specific provisions in World Trade Organization (WTO) or bilateral trade agreements, could be anticipated. Examples of possible challenges and likely consequences of these challenges are listed in Table 3.

The following steps could be followed in risk assessment with the ultimate aim of determining the likelihood of its occurrence and the seriousness of its consequence/s. For several risks, the exercise would aim at ranking their relative seriousness so that responses could be prepared and set into priorities.

1. **Assessment**. To provide an example of an assessment matrix for social risks, we pick the farm worker and the "community" as resources under threat. A column on modifying factors, i.e. what could reduce or aggravate the risk, is introduced (Table 4).
2. **Quantification** of social risks allows proper comparison and prioritization against perhaps more easily quantifiable technical risks. It also allows a proper decision as to which risk or set of risks justify and are amenable to more detailed analysis and evaluation. For aquaculture, a risk evaluation matrix could be developed using a rating system for the severity of the consequence of a challenge and its likelihood of occurrence, as in the example given in Table 5.

The information on severity of impact and likelihood of the risk happening could be derived from historical experiences and expert views. Descriptors for severity of social risks are provided as examples in Table 6.

3. **Descriptors** of likelihood of occurrence could be as given in Table 7.
4. **Ranking.** The result enables a ranking of risks so that responses could be also prioritized. Table 8 illustrates this step.
5. **Developing a risk table.** The next step is to rank the issues, assign an issue according to its rank under one of six categories and develop a risk table such as the one show in Table 9.

This process should be completed for each of the identified issues with a risk ranking developed and the rationale for assigning these rankings recorded. The actual risk assessment is not just the scores generated during the assessment process. It should include the appropriate level of documentation and justification for the categories selected, as illustrated in Table 10.[2]

[2] Another guide for risk rating is "HPSS guidance on analysis of risk/risk rating matrix" (www.hsspsni.gov.uk/guidance_on_analysis.pdf).

TABLE 3
Some examples of direct and indirect consequences of social hazards

Internal social responsibilities	**Hazards**	**Consequences and Likely challenges from society**
Workers	• Technology that might displace labour • Technology requiring higher skills • Workplace conditions • Pest and disease control operations	• Unemployment – management–labour conflict, human rights and welfare issue, work-related injury or illness, cessation of operations due to labour unrest, bad press, negative report, public criticism, lawsuit
Cultured animals	• Feed ingredients (i.e. melamine) • Pollution hazards • Drugs and chemicals • Stocking density	• Animal welfare issue – bad press, boycott, ban • Negative report or public criticism
External Social Responsibilities	**Hazards**	**Consequences**
Community and the environment	• Location of farm • Use of common natural resources like water • Density of farm structures • Containment of cultured organisms • Waste and effluent disposal systems • Employment practices, terms • Purchasing practices • Predator eradication practices • Introductions of species for farming	• Access to source of livelihoods barred or made difficult –conflict with community • Contamination of water resources, loss of livelihoods from wild fishery – capture-culture conflict • Conflict with common users of resources • Local resentment at missed job opportunities leads to elements of the local community blockading the site • Accidental damage to wild fishery or farm crops – bad press, conflict with fishers • Spread of disease, pests or predators – bad reputation; negative report; public criticism
Suppliers, product buyers, processors, traders	• Buying practices • Feed and additives • Drugs and chemicals • Perceptions of product quality	• Loss of trust – loss of market, tarnished product or farm reputation, blacklist
Global social responsibilities	**Hazards**	**Consequences**
Consumers	• Feed and additives • Drugs and chemicals • Perceptions of product quality • Feeding practices (use of trashfish)	• Loss of market; tarnished product image and sector reputation – bans, boycotts, lawsuits, product avoidance • Environmental action
	• Appearance of cheaper substitutes, development of competitive products, change in preferences and tastes	• Loss of profitability, competitiveness and market
Aquaculture industries in other countries	• Subsidies • Species and production targets • Marketing practices	• Market access issues: bans, boycotts, antidumping measures, countervailing tariffs – loss of market. • Harm to livelihoods of farmers in other countries – trade related challenges (i.e. anti-dumping), higher tariffs – loss of market access

TABLE 4
An example of an assessment matrix for social risks

"Resource" Under Threat	**Threats to resource**	**Causes**	**Consequences**	**Modifying factors (reduce (–) or aggravate (+) risk)**
farm labour	• Displacement • Injury or illness	• Labour-saving technology • Unsafe, unsanitary working condition, lack of protection; lack of knowledge of safety measures	• Lawsuit • Bad press • Community resentment • Strike	• Skills training (–) • Cutting corners on employee safety (+) • Investment in training and safety devices (–)
Community goodwill or cooperation	• Pollution of water bodies, croplands • Perceived exploitative practice	• Leaks, spills, discharge of effluent • Unfair labour terms or unethical hiring practices	• Community hostile action • Lawsuit • Bad press	• Water treatment system (+) • Forced labor (+) • Child labour(+) • Illegal wage structure (+)

SOCIAL RISK MANAGEMENT

Concepts and definitions

Risk management is the process of bearing the risk you want to bear, and minimizing your exposure to the risk you do not want. This can be done in several ways: **not doing things** that carry a particular risk; **hedging,** which involves deliberately taking on a new risk that offsets an existing one, such as your exposure to an adverse change in an exchange rate, interest rate or commodity price; and **diversification,** which means not putting all your eggs in one basket (having a portfolio in which you hold several different shares and assets helps to reduce risk; and buying insurance (in economic terms, anything used to reduce the downside of risk. In its most familiar form, insurance is provided through a policy purchased from an insurance company. A fuller definition would include, for example, a financial security (or anything else) used to hedge, as well as assistance available in the event of disaster. The latter could be provided by the government in various ways, including welfare payments to sick or poor people and legal protection from creditors in the event of bankruptcy.[3]

TABLE 5
Example risk evaluation matrix

Severity	Likelihood of Occurrence
0- Negligible	1- Remote
1- Minor	2- Rare
2- Moderate	3- Unlikely
3- Severe	4- Possible
4- Major	5- Occasional
5- Catastrophic	6- Likely

Source: FRDC Australia, 2004

TABLE 6
Examples of descriptors for severity of social risks

Severity Level	Social risk consequence
Negligible (0)	General – insignificant impacts to aquaculture at any level (farm, industry or sector); unlikely to be measurable or to cause challenge from any sector.
Minor (1)	Challenges likely to be a nuisance and can be addressed or responded to with minimum of effort and expense.
Moderate (2)	Challenges will likely impact on reputation of farm, industry or sector with one or a few consequences; can be addressed before it escalates into a major challenge.
Severe (3)	Challenge will place the reputation of an entire commodity industry at stake; has the potential of escalating into a major challenge; could result in an abrupt loss of market access and profitability.
Major (4)	A major challenge or sets of challenges from various empowered stakeholders that will have very costly and several interlinked consequences such as bans, boycotts, hostile action, lawsuits, blacklist etc; could jeopardize welfare of people in the sector; response is needed from the sector as a whole and will entail much expense and effort; recovery can take a few years.
Catastrophic (5)	Closure; bankruptcies, widespread collapse of the industry; long-term recovery period.

TABLE 7
Descriptors or likelihood of occurrence

Likelihood	Definition
Remote (1)	Never heard of but not impossible
Rare (2)	May occur in exceptional circumstances
Unlikely (3)	Uncommon but has been known to occur elsewhere
Possible (4)	Some evidence to suggest it is possible to occur
Occasional (5)	May occur
Likely (6)	Expected to occur

Source: FRDC Australia, 2004.

Arrangements and strategies

The next section largely borrows from Holzmann (2001). The concepts and examples would appropriately but not exclusively apply to poor and small farming households.

Social risk arrangements

Arrangements to deal with vulnerability fall into three main categories: (i) informal, (ii) market based and iii) public arrangements on a large scale. In an ideal world with

[3] "Economics from A to Z", www.economist.com.

TABLE 8
Quantifying social risks by severity and likelihood of occurrence, an example

	Consequences and likely challenges from society	a. Severity of impact	b. Likelihood of occurrence	Score (A x b)
1	Unemployment: management–labour conflict	4	6	24
2	Human rights and welfare issue	3	3	9
3	Work-related injury or illness	4	5	20
4	Cessation of operations due to labour unrest	4	6	24
5	Bad press, negative report, public criticism	2	6	12
6	Lawsuit	4	3	12
7	Animal welfare issue – bad press, boycott, ban	2	2	4
8	Negative report or public criticism	2	5	10
9	Access to source of livelihoods barred or made difficult: conflict with community	4	4	16
10	Contamination of water resources, loss of livelihoods from wild fishery – capture-culture conflict (with other stakeholders)	4	5	20
11	Conflict with common users of resources	4	3	12
12	Local resentment at missed job opportunities leads to elements of the local community protesting or blockading the site.	3	5	15
13	Accidental damage to wild fishery or farm crops – bad press, conflict with fishers	5	3	15
14	Spread of disease, pests or predators – bad reputation; negative report; public criticism	4	3	12
15	Unethical buying/marketing practice; bad product: loss of trust, loss of market, tarnished product or farm reputation, blacklist	5	3	15
16	Market access issues: bans, boycotts, antidumping measures, countervailing tariffs – loss of market.	4	5	20
17	Harm to farmers in other countries – trade related challenges (i.e. anti-dumping, higher tariffs – loss of market access)	4	6	24

TABLE 9
Example of risk table

		Consequence					
Likelihood		Negligible	Minor	Moderate	Severe	Major	Catastrophic
		0	**1**	**2**	**3**	**4**	**5**
Remote	**1**	**0**	**1**	**2**	**3**	**4**	**5**
Rare	**2**	**0**	**2**	**4**	**6**	**8**	**10**
Unlikely	**3**	**0**	**3**	**6**	**9**	**12**	**15**
Possible	**4**	**0**	**4**	**8**	**12**	**16**	**20**
Occasional	**5**	**0**	**5**	**10**	**15**	**20**	**25**
Likely	**6**	**0**	**6**	**12**	**18**	**24**	**30**

Source: FRDC Australia, 2004.

perfectly symmetrical information and complete and well-functioning markets, all risk management arrangements can be market based. In reality, all risk management arrangements will play important roles that could change over time.

- **Informal –** With no or incomplete market institutions and public provision of support, households and small farms respond to risk by protecting themselves through informal and personal arrangements. Credit from relatives and self-help group arrangements are examples.
- **Market based –** Where available and affordable, smallholders and households take advantage of the financial products offered by insurance companies and banks. Because formal market institutions have difficulty to lend or provide insurance to small farms without secured earnings and improved access to information,

TABLE 10
Risk ranking definitions and reporting requirements

Risk	Reporting		Management response
Negligible	0	Short justification only	Nil
Low	1	Full justification needed	None specific
Moderate	2	Full performance report	Continue current arrangements
High	3	Full performance report	Probable increases to management
Extreme	4	Full performance report	Substantial additional management needed

micro-credit and insurance are potentially interesting instruments for social risk management.[4]

- **Public – This category** takes various forms. When informal or market-based risk management arrangements do not exist (there is no insurance), the government can provide or mandate social insurance programmes for risks such as unemployment, work injury, disability and sickness, and compensation schemes for catastrophes or unusually large damages to assets and crop. Additionally, governments have a whole array of instruments to help farms cope after a shock hits, such as social assistance, subsidies on basic goods and services and public works programmes. Through legislation, government is also able to introduce prevention strategies such as zoning, safety standards, property rights and protection of rights to assets. Many government programmes (in health, education and infrastructure) also play an important role in social risk prevention.

SRM strategies

Social Risk Management (SMR) consists of three strategies: prevention, mitigation and coping.

Prevention strategies are those that reduce the probability of the risk occurring. Measures that could apply to aquaculture include:

- skills training or job function improvement to reduce the risk of un/under-employment or low wages that are probably man-made;
- optimizing macroeconomic policies to reduce the shocks of financial crisis, such as oil price surges or unpredictable market moves on currencies;
- for natural disasters and environmental degradation, deploying a networked pre-warning system or sustainable, renewable and environmentally friendly ecosystem management strategies and practices to minimize the impact of the consequences, such as flooding, earthquakes, drought, global warming and soil acidity or salinity;
- in human and animal health care, focus is on the preventing epidemics and the introduction of pathogens by awareness and educational programmes, responsible movement of live animals, quarantine, certification etc.; and
- for social security, establishing a farm mutual to compensate for loss of assets, disability or chronic illness.

Mitigation strategies focus on reducing the impact of a future risk event. Common practices include:

- diversifying to a reasonable level that is commensurate to the resources and management skills of the farmer, to spread the risk[5] as well as reduce shock from a crop wipeout;

[4] A hybrid programme for insurance by which, broadly, insurers cover insurable perils and the government covers the social risk that insurers normally do not cover, was proposed at the FAO/NACA/APRACA Regional Workshop to Promote Aquaculture Insurance in Asia held in Bali, Indonesia on 30 April–2 May 2007. A draft guideline, discussed at the workshop, was being finalized.

[5] A study in India by Brugere (2003) noted that at the village level, crop diversity increases with risk, up to a point, then decreases, which contradicts the assumption of crop diversification as a strategy to decrease risk. It concluded that with limited resources, crop diversification may increase income but does not reduce risk.

TABLE 11
Strategies and arrangements of social risk management: examples for aquaculture

Arrangements/ Strategies	Informal	Market-based	Public
Risk Prevention and Reduction			
	• Self-help grouping or association of farmers • Better farm management practices • Less risky production – low tech-low input; non-diversified • Off-farm employment	• Food safety certification • Environmental standards • Market-driven labour standards • Market information access	• Labour standards, regulations • Child labour reduction interventions • Gender policies • Skills training
Risk Mitigation			
	• Self-help grouping • Diversified enterprise • Savings • Investments in human, physical and real assets • Investment in social capital	• Credit • Crop and assets insurance • Life, accident, health insurance	• Property rights • Support for credit and insurance • Green subsidies
Risk Coping			
	• Sale of real assets • Borrowing from relatives	• Sale of financial assets	• Social assistance • Compensations to damages

Source: Adapted from Holzmann, 2001.

- micro-financing to smallholders; and
- insurance.

Coping strategies are designed to relieve the impact of the risk event once it has occurred. Usual measures are:

- issuing government relief and rehabilitation funds for very serious risks such as disasters or epidemics;
- immediate compensation schemes for serious damages to crops and assets caused by intentional or accidental pollution or acts that result in extensive damage; and
- alternative and emergency employment such as work-for-food programmes.

Table 11 lists examples of social risk management strategies through informal, market-based and public arrangements. Among small-scale farmers, being organized into a self-help group or a formal association would increase their capacities to prevent and mitigate, as well as cope with, social risks. Large corporate farms joined into alliances (such as the Global Aquaculture Alliance (GAA)) are able to deal with strategic risks, many of which are challenges to the (shrimp) industry from various parties. Strategic management of social risks is discussed in the next section.

Strategic and integrated risk management

The complexity of impacts and difficult-to-pinpoint origins of social risks reinforce the need for integrated approaches to strategic risk management. Strategic risks can scale rapidly in geographic terms: what looks like a local public relations issue could turn from a one-time cost and simple response into an issue involving a sector's, industry's, company's or farm's reputation.

For strategic risks, in contrast with traditional compliance or hazard risks, risk and opportunity are often two sides of the same coin. A strategic risk that is anticipated early and mitigated well can be converted into a new market, a competitive advantage, a stock of goodwill or a strategic relationship (Bekefi, Jenkins and Kytle, 2006). The introduction of new technology could be an opportunity to upgrade the skills of the workforce (rather than laying off workers) through in-house training or an industry-wide skills upgrade programme and thus improve labor efficiencies and enhance goodwill. Competition for freshwater by an aquaculture sector such as shrimp farming with the community could be an opportunity to educate the community on water-

saving techniques, demonstrating water-recycling and re-use measures, develop a market-based water-pricing mechanism with the local government, and introduce sanitation and health programmes to the community.

The aquaculture sector is familiar with a number of social risks. Certification and ecolabeling schemes, developing alliances with various sectors and working with stakeholders to build or re-build trust and reputation in order to avoid or limit the damage or to engage on the issues to prevent future incidents are strategic responses that the sector could make. The Code of Conduct, International Principles for Sustainable Shrimp Aquaculture, and other codes (some developed by the industry, such as the Federation of European Aquaculture Producers' (FEAP), Code of Practice and GAA's Code of Conduct) provide guides by which aquaculture farmers can understand and address the range of social and environmental issues that affect them and on which they can have an impact. There have been initiatives that go beyond understanding the issues to identifying and engaging other stakeholders in those issues. FEAP routinely engages researchers and scientists (i.e. with the European Aquaculture Society) as well as the mass media (i.e. AQUAMEDIA) in discussing various issues that impact on the industry and by communicating its opinions to the concerned bodies such as the European Commission (Hough and Bueno, 2003).

Building relationships can help farms or a commodity sector gain freedom from stakeholder challenges to their management and business practices. It can contribute to a reputation for good behaviour (i.e. by adhering to a code of conduct, better management practices (BMP), good aquaculture practices (GAP) or eco-label certification) that could give an industry or a farm advantage with ethical consumers and investors. Strong relationships with stakeholders that are maintained over time can be an insurance: they buy time and patience from those with the power to challenge the farm or the sector when it causes a negative social impact. These relationships can be good sources of sensing emerging risks and opportunities. They can help to identify the issues, understand the dynamics behind them and track them as they evolve. These relationships may form the basis of more collaborative operational partnerships with stakeholders actively helping the industry mitigate risks and capture new opportunities (Bekefi, Jenkins and Kytle, 2006).

For the aquaculture sector, alliances with consumer groups, supermarket chains, researchers and technology developers, and civil society organizations with social agenda are examples. The sector should build relationships that are conducive to managing the risks and opportunities arising out of the issues in which both parties have common stakes, such as food quality and safety, eco-labeling and development of certification standards, as well as fair trade. Ultimately, it is a farm's commitment to its customers and to socially responsible farming that assures a lasting relationship.

SOCIAL RISK COMMUNICATION

The aim of risk communication usually is to avoid or correct misperceptions of a risk. It goes without saying that the source of the message must be able to understand the sources and causes of anxieties and perceptions of stakeholders. In short, there has to be a common understanding between the communicator and the public about the elements of the risk. Communication is a tool for risk management. One important arm of "corporate social responsibility" (CSR) is a public affairs or public relations unit with the capabilities and expertise to manage strategic risks stemming from social (and environmental) issues. In the aquaculture sector, with the obvious absence of a CSR body for small, widespread or independent farms, the alternatives have included organizing into associations and federations (e.g. FEAP) and alliances (e.g. GAA and Shrimp Producers Association of Thailand) that include suppliers of inputs and processors/exporters). The "CSR function" or parts of a CSR unit's functions are performed to some extent and in a disinterested manner consistent with their mandates, by organizations

like the Network of Aquaculture Centres in Asia and the Pacific (NACA), the South East Asian Fisheries Development Center (SEAFDEC), INFOFISH and FAO. They develop with other stakeholders guidelines for responsible farming and strategies for communicating, sharing and promoting awareness and adoption.

In the context of communicating social risk, a "CSR" action (whether by the industry itself or in cooperation with development organizations) contributes through two means: (i) providing intelligence, awareness and insight about what those risks are, and (2) offering an effective means to respond to them. The key to both is managing stakeholder relationships (Bekefi, Jenkins and Kytle, 2006).

An equivalent activity to managing stakeholder relationships in a sector with many small, poor farmers is getting organized into self-help groups or more formal associations and cooperating with suppliers, buyers, support services, civil society organizations, government and regional and international development organizations. Information flows between stakeholders and the sector can form the base of knowledge about social issues and the nature of those problems (Kytle and Ruggie, 2005). Among the key questions that can be answered by engaging with stakeholders on a particular social issue are:

- What is the issue or problem?
- How complex is it?
- What is its scope?
- Who else has an interest in the problem?
- What is working and not working in the current approach?
- What would be accomplished by engaging others in the dialogue?

A process for internal and external risk sensing, reporting and monitoring should be employed. By partnering with other social actors including civil society organizations, the aquaculture sector can also improve the conditions that pose emerging risks for them in the first place. As an example, global and national companies now collaborate to build greater social capacity to respond to shared challenges like epidemics and the HIV/AIDS crisis, drugs, trafficking, child labour, and other social issues.

CONCLUSIONS

Social risk analysis in aquaculture can benefit from the methodology developed for biological (i.e. pathogen) risks, up to a point. The complexity of the origins of social risks and the difficulty of establishing a hierarchy among numerous possible consequences make it extremely difficult to establish causal relationships. Table 12 illustrates this constraint.

TABLE 12
A matrix illustrating the complex nature of the origins and impacts of social risks

Consequences	Challenges	Possible origins
• Loss of market that leads to…	• Public exposure (news and criticism)	• Residues found in product
• Loss of viability that may lead to...	• Court action	• Mass fish kills (cultured and wild)
• Closure of farm or industry that will mean…	• Boycott of product	• Accidental or intentional discharge of pollutant (pollution, salinization)
• Loss of employment of workers in the farm or the industry including ancillary… and	• Trade challenges – antidumping, non-tariff barriers (NTBs)	• Conflicts with common users of resource
• Loss of livelihood of the farmer and/or a lot of other people	• Hostility to farm or company	• Conflicts with community in general
	• Introduction of a cheaper or preferred product substitute	• Government action
	• Competition from an industrial-scale and more efficient farm	• Loss of competitiveness
	• Change in consumer tastes and preferences	• Introduction and spread of pests and/or diseases
		• Cost-price squeeze
		• Civil unrest

The definition adapted for social risk provides a departure to the concept of origin of risk.

It essentially says that a social risk is the result of a provocation by the sector, industry or farm on society. The provocation, which could simply be based on a perception, results in a challenge. The challenge constitutes the risk, which has myriad possible consequences with various degrees of severity. To bring risk analysis to a degree of simplification and system, it is suggested that one starts by defining aquaculture's spheres of social responsibility; identifying the stakeholders to which it has to be responsible; and drawing from codes of conduct, codes of practices, ecolabeling and certification schemes, labour standards, food safety standards and environmental standards a list of hazards that could turn into social risks. It would be useful to develop a methodology for social risk estimation, the practical application of which is to predict the types of challenges and their degrees of severity so that an early response could be devised to address the challenge. The insurance sector could provide the tools for developing a social risk estimation methodology.

An aquaculture risk data bank, which is akin to a risk register in project risk analysis and management (RAMP, 2004), in which all possible hazards and risks are classified as to their nature, causes, consequences, impacts, severity of impacts, likelihood of occurrence and other characterizations would be a helpful tool for risk analysis and reference for commercial insurers and governments, the latter for devising social insurance programmes. A risk register lists all the identified risks and the results of their analysis and evaluation. Information on the status of the risk is also included. The risk register is continuously updated and reviewed throughout the course of a project. A risk register is best presented as a table for ease of reference and should contain the following information:[6]

- risk number (unique within register),
- risk type,
- author (who raised it),
- date identified,
- date last updated,
- description,
- likelihood,
- interdependencies with other sources of risks,
- expected impact,
- bearer of risk,
- countermeasures, and
- risk status and risk action status.

FUTURE CHALLENGES AND OPPORTUNITIES: SOCIAL RISK AND SUSTAINED GROWTH

If the industry, a farm or the sector as a whole adheres to socially responsible practices, it is fair to expect it would face very little challenge and none that is serious. The need therefore is to enable the farmers, processors, traders, input suppliers and others in the chain to adopt the codes, adhere to better practices and comply with regulations. A particular challenge is how to prevent free-riding, rent-seeking and corruption and other opportunistic behaviours that would surely invite challenges to the sector. This shifts the focus of the issue to governance mechanisms, particularly the effectiveness of various mechanisms of governance (mandatory, market-based and voluntary) instruments. The other side of the issue is the ability of farmers to comply with an increasing number and stringency of requirements without jeopardizing their profitability; the challenge is for farmers to see as sensible to business to adopt and

[6] The Green Book. www.greenbook.treasury.gov.uk

comply with all these requirements. A number of pilot studies and initiatives offer evidences of the effectiveness of such strategies as organizing into farmer groups or more formal associations and adopting BMPs (Bueno *et al.,* 2007a, 2007b).

The opportunities presented by these challenges are many and varied: a small list would include making it attractive for insurers to insure aquaculture operations, particularly the numerous small farms; developing a hybrid insurance approach that combines the market-oriented and social (public) insurance schemes; and a better system for micro-financing (FAO/NACA/APRACA 2007). The demand-side opportunities would include organizing farmers and promoting adoption of better practices. The broader challenge and opportunity is the strengthening of national farmer servicing systems that cater to the numerous small farmers. The greatest opportunity is to let the farmer know, and to assure the sector, that a social risk-free environment, which is predicated on socially responsible behaviour, translates to sustained growth and development. Finally, a possible framework by which analysis of various genera of risks (natural, physical, environmental, economic and social) might be integrated is outlined in **B**ox 4.

The five livelihood assets are linked through an asset pentagon (Figure 1) that allows comparison of status before and after an intervention; in short it enables assessment of changes. The pentagon allows the change in each angle to be shown in terms of an increase or decrease in the assets; the shape of the pentagon of assets plotted is more important than the absolute magnitude. The livelihood outcome is the result of an analysis of livelihood strategy and assets. One livelihood outcome is the loss of it. Threats to a means of livelihoods to any of the five livelihoods assets could thus

BOX 4

Sustainable livelihoods analysis: a possible integrative framework for risk analysis

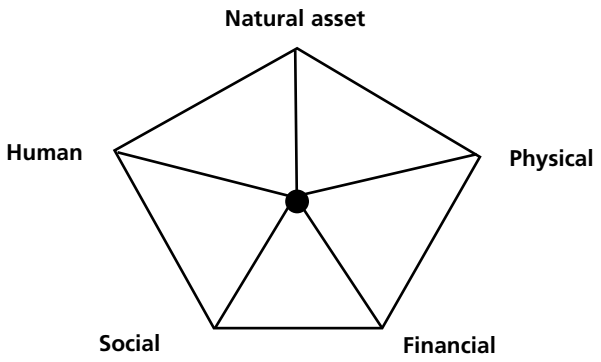
The Department for International Development (DFID)[7] has been promoting a framework for livelihoods analysis, based on the concept that *"a livelihood comprises the capabilities, assets, and activities required for a means of living"* and the proposition that *"a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base".* Based on this concept, Rakodi and Lloyd-Jones (2002) identified five livelihood assets, as follows:

- *Natural:* the natural resource stock, which is derived for livelihood use; includes land, water, forest and other natural resources.
- *Physical*: the stock built by humans; basically an infrastructure, such as an irrigation system, transportation system, pond system, pen-culture and cage-culture installations.
- *Human:* includes what is generally known as labour and knowledge. Labour has qualitative and quantitative dimensions. Quantitative refers to the number of household and hired labour, and qualitative refers to the level of education, skill and the health status of labour. Technology that is learned and utilized is part of this human asset.
- *Financial/economic:* is associated with income, expenditure, savings and loan (it includes all kinds of production investment).
- *Social:* refers to the social networks, group relationship and access to wider institutions of society.

[7] http://www.livelihoods.org/info/guidance_sheets_pdfs/cover.pdf

be described and assessed using this framework. A risk is an intervention, albeit unplanned. Adopted for risk analysis, the same framework could be used for assessing the impacts of various kinds of risk on each livelihood asset. This would give a holistic perspective of the consequences of various types of risks on the farm household.

FIGURE 1
The asset pentagon



Source: Rakodi and Lloyd-Jones, 2002.

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