

Social Capital and Community Problem Solving:  
Combining Local and Scientific Knowledge to Fight Invasive Species

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**Abstract**

Globalization has greatly speeded up the movement of goods, services, money and people, as well as pests that threaten food supply and the environment. Invasive organisms have an advantage, as they are in an environment where their natural competitor and enemies are absent. Early identification is critical for control and possible eradication. That identification must rely on local communities, with their knowledge of what is “normal” in terms of natural capital in order to spot the “abnormal” in terms of difference in plant communities. By using early identification of invasive species and working with the scientific community they can develop mechanisms of control and eradication of a variety of invasive species. The community capitals framework allows us to mobilize local resources and combine them with external resources for a vital economy, social inclusion and a healthy ecosystem.

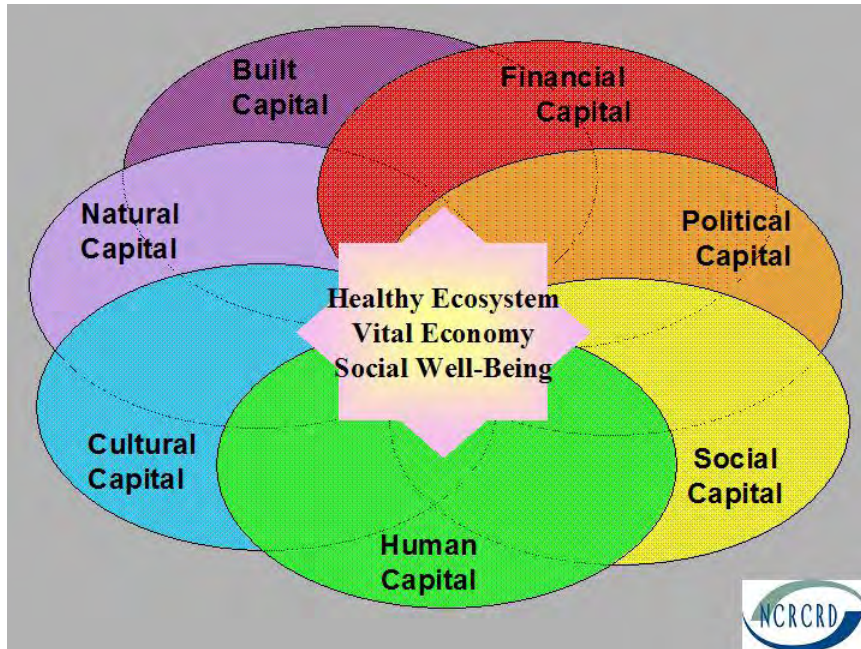
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## **Introduction**

Ecosystems are increasingly vulnerable to dramatic changes. Island ecosystems have always been vulnerable to natural disruptions, such as storms and volcanoes. Winds and birds brought new pests that changed the ecosystem through competition and new plant and animal diseases. But the actions of human beings speed up these changes – and the rapidity with which ecosystems could respond. Climate change creates more extreme weather events, and provides new conditions for pests to thrive. And human commerce is accompanied by the introduction of new pests, both consciously (as the introduction of kudzu in the South of the United States or rabbits in Australia) or inadvertently, as pests were part of shipments of seed (as with Russian thistle in the U.S.) or just passengers on pallets or in shipping containers.

Ecosystem health is a part of the triple bottom line: a vital economy and social inclusion (Flora, 2001). While invasive species most directly to effect the ecosystem, and through that, the economy, social inclusion is also a critical part of responses to and impacts of invasive species. Often it is those who are excluded in a variety of ways from society's resources who have the best view of what is actually happening at the ground level. By increasing social inclusion and building on the resources of local communities, it becomes easier for society as a whole to identify and respond to potential threats. By investing in community capitals, local communities and the scientific community can collaborate to increase the triple bottom line. We have found the community capitals framework to be helpful in addressing systems issues such as biosecurity (Flora, 2001) and ecosystem health (Flora 2004a; Gutierrez-Montez, 2005)).

While others have used different capitals in considering livelihood strategies (Bebbington, 1999; DIFD 1999, 2000, 2001; Carney, 1998; Pretty, 2000, 1998), our practice and scholarship has found that consideration of these seven is critical in making sure that programs are both sustainable and effective. We take a social fact view of these capitals, seeing that at the community level these are more than the sum of individual attributes (Durkheim, 1902, 2001).



### **Community Capitals**

All communities have resources that can be reduced, saved for future use, or invested to create new resources. When those resources are invested to create new resources over a long time horizon, we refer to them as “capital”. The capitals are both ends in themselves and means to an end. Only a dynamic balance among the capitals and investments in them can sustainable strategies emerge to address the emergent threats of invasive species in a global economy and a rapidly changing climate.

## *Natural Capital*

**Natural capital** refers to those assets that abide in a location including weather, geographic isolation, natural resources, amenities, and natural beauty. Water, soil and air – their quality and quantity – are a major building block of natural capital, as is biodiversity (Costanza, et al. 1997). Invasive species damage biodiversity, which can then impact the landscape, water quality and even water quantity. Dying forests contribute to global warming. Rural development activities influence natural capital, often negatively, decreasing long term development. Natural capital in turn determines the limits as well as opportunities for human action. As different groups, based on ethnicity, gender, and class have different access and control over natural resources, the effective identification and control of invasive species requires that make access to natural resources more inclusive.

By building on local and scientific knowledge, we hope to development healthy ecosystems with multiple community benefits, where human communities act in concert with natural systems, rather than simply to dominate these systems for short term gain (Ostrum, 1990; Ostrum et al. 1994). Early detection and control of invasive species can help assure multiple and inclusive community benefits. And, most importantly, by utilizing a neutral convener around detecting and eradicating or controlling invasive species, communities and scientists can help those with conflicting uses of natural capital find common ground.

**Cultural capital** reflects the way people “know the world” and how to act within it as well as their traditions and language. It includes cosmovisión (spirituality and how the different parts are connected), ways of knowing, food and language, ways of being, and definition of what can be changed. Very often local people will have multiple terms for stages of plant and forest growth that can give an early warning that a situation is abnormal and an exotic pest may be present. That ability to see differences is very important in identifying the possible presence of a new pest or condition.

Cultural capital influences what voices are heard and listened to, which voices have influence in what areas, and how creativity, innovation, and influence emerge and are nurtured. Hegemony privileges the cultural capital of dominant groups (Bourdieu 1986, Flora, et al., 2004). Monitoring the condition of community capitals allows excluded groups to appropriate and negotiate with the cultural capital of dominant groups.

When scientists and change agents are successful in investing in cultural capital, cultural differences are recognized and valued, and ancestral customs and languages are maintained. By investing in maintain diversity in culture, bio-diversity and different ways of approaching change can be utilized to enhance all the capitals.

**Human capital** includes the skills and abilities of people to develop and enhance their resources, and to access outside resources and bodies of knowledge in order to increase their understanding, identify promising practices, and to access data to enhance community capitals. Formal and informal education are investments in human capital (Becker, 1964; Schultz, 1961, 1963, 1964). Human capital also includes health and leadership. Often men and women learn different aspects of their environment. The

different aspects of human capital are important to acknowledge (Flora and Kroma, 1998).

Universities and the scientists connected with them often think of themselves as the major creators of high level human capital, transferring knowledge from scientists to those who will benefit from using it. However, addressing human capital for rural development and biosecurity requires a much more nuanced role than the expert transferring knowledge that has been generated from the scientists on their faculties. Instead, university investment in human capital for rural development includes identifying the motivations and abilities of each individual to improve community capitals, increase the skills and health of individuals to improve community capitals, and recombine the skills and motivation of the community to move to a more sustainable collective future. In particular, when partnering with local communities to enhance biosecurity, it is important to transfer knowledge based on what is already there, acknowledge the special place of local knowledge and the complementary with scientific knowledge in order to promote biosecurity.

**Social capital** reflects the connections among people and organizations or the social glue to make things, positive or negative, happen (Coleman, 1988; Portes and Sessenbrenner, 1993). It includes mutual trust, reciprocity, groups, collective identity, sense of a shared future, and working together (Putnam, 1998, 1995; 1993a, b). It is extremely important for creating a healthy ecosystem and a vital economy (Triglia, 2001; C. Flora, 1995, 1998a, 2000; J. Flora, 1998).

Bonding social capital refers to those close ties that build community cohesion. Bridging social capital involves loose ties that bridge among organizations and communities (Narayan, 1999; Daasgupta and Serageldin (2000)). A specific configuration of social capital – entrepreneurial social capital (ESI) is related to community economic development (Flora and Flora, 1989; 1993; Flora, et al., 1997). ESI includes inclusive internal and external networks, local mobilization of resources, and willingness to consider alternative ways of reaching goals.

University investments in both bridging and bonding social capital are often a key entry point for participatory rural development. It is important, however, for universities to understand that entering with high levels of bridging social capital that brings access to a wide variety of resources can actually impede the building of bonding social capital and lead to clientelism. When outsiders provide resources to a community, without the community organizing to determine how those resources can build to a sustainable common future, traditional dependency on political parties and politicians, based on personalistic relations of one or two people, are simply transferred to the scientists involved. It is best for universities to begin working for biosecurity in areas where there is some bonding social capital, as shown in previous experience of local action for the common good and, through bridging social capital, help build flexible and porous boundaries that can increase inclusion. Social capital can be a key vehicle of cutting transaction costs in linking local and scientific knowledge to control and eradication of invasive species.

When universities invest in both bridging and bonding social capital, communities and regions demonstrate improved initiative, responsibility, and adaptability. Indicators

of a balanced increased in bridging and bonding social capital include a shared vision (which takes time and trust to develop), building first on internal resources (which means the community has together determined their existing assets that can be turned into capitals for participatory rural development, looking for alternative ways to respond to constant changes (rather than the silver bullet solution that a certain investment will solve everything), the loss of the victim mentality (feeling overwhelmed by globalization or climate change), and loss of a cargo cult mentality (where the community waits for an outside investment to rescue them).

**Political capital** reflects access to power, organizations, connection to resources and power brokers (Flora, et al. 2004). Political capital is the ability of a group to influence standards, regulations and enforcement of those regulations that determine the distribution of resources and the ways they are used. When a community has high political capital, its people have the collective ability to find their own voice and to engage in actions that contribute to the well being of their community.

In many countries, political capital has been commonly defined as the power to disrupt or stop something from happening, or to get specific goods from a central authority. (Aiger, et al. 2001) As the exclusion of groups decrease through increasing bridging and bonding social capital, their power of negotiation, particularly in identifying allies that share their vision for a sustainable rural future with increased biosecurity, grows.

Indicators of increased political capital to which the university can contribute to through participatory rural development include organized groups work together for biosecurity, local people know and feel comfortable around powerful people, including scientists and government functionaries, and local concerns are part of the agenda in the regulation and distribution of resources related to increasing biosecurity. Often universities focus on the technical or mechanistic means to increase biosecurity and further development, which serves to mask or obscure the fundamentally political nature of the development process. By the university helping rural residents engage in the discussion of policy issues around biosecurity, and avoiding support of particular candidates, political capital, which is essential for decisions to change at all levels, can be built and used for biosecurity and rural development.

**Financial capital** refers to the financial resources available to invest in community capacity building, to underwrite invasive pest control and businesses development, to support civic and social entrepreneurship, and to accumulate wealth for future community development. Financial capital is often privileged, because it is easy to measure. There is a tendency to monetize other capitals, rather than considering the reverse: money gained from natural resource destruction or child labor results in the decline of natural and human capital. Money that is spent for consumption is not financial capital. Money that is put aside and not invested is also not yet financial capital. It must be invested to create new resources to become capital. Universities can help identify and create sources of financial capital within rural areas. Linking biosecurity to financial capital can help legitimize the activities undertaken by local people as scouts for invasive species and as actors to control them.

Financial capital includes remittances (Landold 2001), savings (particularly by increasing efficiency through better management, credit (Siles, et al. 1994; Wilson, 2000) more skilled workers, use of technology and better regulations), income generation and business earnings (by increasing human capital through skills and social capital through more integrated value chains) (Lorenz, 1999, Mollering, 2002; Talmud and Mesch, 1997), payment for environmental services, loans and credit, investments, taxes, tax exemptions user fees, and gifts/philanthropy. Often universities view rural communities as bereft of financial capital, but, particularly with increasing globalization of the labor force, out-migrants can be even better organized to invest in their communities in a way that is cumulative for rural development.

Bridging social capital can enhance financial capital (Grannovetter, 1973; 1985). Universities can use a number of measures of successful investment in financial capital to create an appropriately diverse and healthy economy and to increase biosecurity. These include reduced poverty, increased business efficiency, increased economic diversity, and increased assets of those who live in the community. Universities should develop indicators of changing economic conditions with the communities, as very often externally imposed indicators may hide the extraction of wealth that has over the centuries impoverished many rural people.

Built capital includes the infrastructure that supports the other capitals. (Flora, et al. 2004). It includes such diverse human-made objects and systems as sewers, water systems, electronic communication, soccer fields and processing plants. And it includes the kinds of scientific equipment needed for the identification and eradication of invasive species.

Built capital can enhance or decrease the quality of other capitals. An example of such potential for both enhancement and degradation is a rural water system, which can run sewage into the stream the community depends on for drinking water, or provide for appropriate and cost-effective sewage treatment (Flora, 2004). Further, it can determine access to the other capitals by different sectors of the community.

Universities involved in rural development research and practice can use the following indicators of the positive impact of build capital. Rural physical infrastructure enhances other community capitals when it serves multiple users (human capital), it can be locally maintained and improved (human and financial capital), it links local people together equitably (bonding social and cultural capital), and it links local people, institutions and businesses to the outside (bridging social and financial capital).

### **Spiraling Down**

Universities often provide evidence that the loss of one capital can lead to disinvestment in other capitals (Waquant, 1997). In particular, decline in natural capital, which is often triggered by invasive species, has been linked to decreased financial capital (lowered productivity and income), decreased human capital (out-migration and illness), decreased cultural capital (loss of bio-diversity and village rituals), and social capital (as there is increased inequality). In rural development situations, universities often come in at what seems like a whirlpool of capital destructions. University actions often are based on technological fixes (a form of built capital) in hopes of at least stemming the downward spiral. By addressing only the immediate threat of invasive

species, sustainable actions to increase community ability to respond to future biosecurity threats will not occur.

### **Spiraling Up**

However, our research (Emery and Flora, 2006) suggests that built capital is not the first investment necessary to reverse the downward spiral. We have found that investment in both bonding and bridging social capital, including accepting the time it takes to build trust and reciprocity, is often a key entry point. And a particularly effective way to build social capital is to work with diverse groups in the community to strengthen youth (human capital). But to reverse the spiral, the university as participatory rural development practitioner must have the patience to build trust and reciprocity through doing what they say they will do (often done best through a constant and well-connected rural presence) and giving local people a way to reciprocate in a way that maintains their dignity and meaning.

### **Conclusions**

Biosecurity is not achieved by science and technology alone. The increasing vulnerability of local landscapes to invasive species requires on-going mobilization of all community capitals in order to have the agility of constant response. Bridging social capital among communities can serve as an early alert that can mobilize local residents and scientists to work together to experiment with and implement appropriate remedial action. But when all the capitals are invested in, including cultural capital so that local populations understand that they do not have to take crop and forest destruction as inevitable, scientist-community partnerships can increase biosecurity for a healthy ecosystem, a vital economy and social well-being (Flora, 2003).



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