

***FERMiers\* Required:***  
***Viewing Virtual Environments of***  
***Banking and Finance as Watersheds***

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*Prepared for delivery at the Workshop on the Ostrom Workshop (WOW5) conference,*  
*Indiana University Bloomington, June 18–21, 2014.*

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*Draft of May 23<sup>rd</sup>, 2014*

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I would like to thank Tom Evans for suggesting the watershed analogy. Through osmosis, I learned from Sergio Villamayor Tomás and Rachel Fleishman, who introduced me to watershed issues through their dissertations, and from Gwen Arnold and Forrest Fleischman for hydrology and forestry-linked teaching from their respective dissertations. Thanks also to Dan Cole for suggested differentiation between water and capital property rights and to Burney Fischer for being the “Forester among us.” Mike Schoon, Marty Anderies and CSID gave much-needed ideas at ASU.

*All mistakes are my own and mine alone.*

\*FERMiers: *Financiers practicing Environmentally-Responsible Management*

## ***FERMiers\* Required:***

### ***Viewing Virtual Environments of Banking and Finance as Watersheds***

This paper conceptualizes financial markets as virtual environments which should be subject to stewardship requirements found in natural environments. As in natural environments, irresponsible self-governance and lax or off-target regulation result in environmental damage and social loss through externalities. The vehicle of watershed governance is proposed as the best-fitting analogy to financial markets governance for seven reasons: 1, scaling the watershed analogy from small to very large fits well with financial markets [community to global]; 2, watersheds and financial markets each consist of a variety of users who 3, tap hydrologic [capital] resources for many different uses; 4, financial markets, like watersheds, are made up of different types of goods, and so 5, better-managed large watersheds are governed through polycentric institutions with a range of public-private governance arrangements; 6, governmental, private sector and mixed agents seek to support and manage [sustainable] exploitation in each; and 7, comparisons of causes and results of environmental degradation between watersheds and financial markets are robust.

The paper integrates literature from watershed governance and environmental management with banking and ERM [environmentally responsible management] to lay foundations of this watershed analogy, develop it, then sketch governance principles. Upstream-downstream interlinkage, soil maintenance and degradation, and cross-border riparian negotiations are used to illustrate challenging financial market governance issues. Effectively managing various types of goods and the property rights issues defining those goods types is discussed.

*Keywords: environmentally responsible management, watershed management, banking and financial governance, riparian systems, pollution haven*

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## **Introduction**

“In environmental economics, there is a basic principle, called polluter pays principle. Wall Street has polluted our economy with toxic mortgages. It should pay for the cleanup.”  
Joseph Stiglitz, Congressional testimony, 2008

Joseph Stiglitz’ stirring testimony before the House Committee on Financial Services echoed the feelings of many observers, participants and regulators involved in financial markets- that the economy had been “polluted” and that cleanup costs should be borne by bankers and financiers. Stiglitz’ idea that financial markets specifically and the economy generally could be viewed as a kind of virtual environment had a long, well-accepted pedigree.<sup>1</sup> But his analogy was incomplete. Acting solely on this idea that “*Wall Street has polluted our economy*” may not lead to a more effective governance model. We need to go further, utilizing lessons from natural resource management and theory from environmental economics to develop and apply a more robust, more comprehensive regulatory and governance regime.

Blame was laid at many doors in the recent financial crisis. Some faulted financial institutions, others government; some blamed consumers, others greedy mortgage bankers. A view coalesced that all parties held some blame (Bhidé, 2010; Congleton, 2012; Lo, 2012, for a comprehensive review of related books). That all parties share responsibility for the crisis leads us to suspect that a simple market-based approach to governance and regulation was ineffective.

In fact financial markets are not simple markets, but rather consist of all four archetypes of goods: private, club, common pool, public (this typology discussed in McNutt, 1999; Ostrom & Ostrom, 1977; Weimer & Vining, 2005). More accurately put, financial contracts may consist of good structures which utilize all four goods arrangements (Cerny, 2014; Selmier, 2014); financial markets upon which they are traded and transacted require appropriately-tuned governance principles and practices.

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<sup>1</sup> As a point of reference, Google Scholar returned 24,600 matches for the term “financial environment” on March 29, 2014.

Readers from environmental economics and natural resource management may find it curious that Stiglitz' environmental referent is broadly used in financial economics. This environmental concept is employed to describe firms, products and geographically-demarcated economies, including localities, states and provinces, countries, regions, or even global financial markets (four representative pieces from top-ranked *Journal of Finance* include Van Horne, 1985; Myers, 2000; Sametz, 1964; Santomero & Siegel, 1982). But this is not so curious; humans see organisms and organic processes in non-biologic entities. This is no less true in economics. Our fundamental principles of economics are based on organic principles of birth, growth, maturity, decay, death, seasonality, ripeness, and stasis or equilibrium.

But we not only analyze economies' growth, chart the life cycles of corporations as juridical persons, and describe capital flow in financial systems using terms like liquidity and viscosity, animal spirits and predator or prey. We not only seek for biological cycles in human-designed organizations as well as in our environment; *we consciously and unconsciously design our institutions using organic principles*. Our design rules embed organic processes into our socially-engineered corporations, or juridical persons (Ciepley, 2013). This extends to seeing corporations as social actors with citizenship responsibilities (Kobrin, 2009; Matten & Moon, 2008; Strike, Gao & Bansal, 2006). With these corporate social responsibilities come deepening requirements to engage in environmentally-responsible management, or ERM (Madsen, 2009; Rugman & Verbeke, 1998; Porter & van der Linde, 1995). It is but a few short steps from requiring the stewardship which we expect corporations to exercise toward natural environments to requiring banks and financial institutions to engage in similar-minded stewardship in financial environments.

This paper proposes a step in that direction. First, I examine why different types of

financial goods may call for a new approach in banking and financial intermediation, and introduce governance analogies from natural environments. Choosing watersheds as the appropriate analogy, the second section integrates concepts and ideas from environmental economics and resource management with banking theory and ERM practices to explore watershed governance as an analogic construct. The third section applies the watershed governance analogy to banking.<sup>2</sup> Lastly, I discuss limitations and extensions of this analogy and conclude. Throughout the paper I seek to introduce the two sides, environmental policy and banking, to each other, and to show what they share in common. Understanding commonalities should lead to better governance mechanisms.

### **Governance Complications arising from Financial Products' Typology**

“Policy makers can only regulate the banking and finance sectors effectively if they have a reasonable idea of how markets work. If regulators believe that capital markets are efficient, they will adopt light-touch regulation with the results we have seen over the past couple of years.” Woolley (2010: 127)

Governance complexity in finance arises partly because of the many different property rights structures of financial products. Many market participants, observers and regulators implicitly assume that all financial products are private goods. Private goods, traded on Smithian open markets theorized as consisting of such large numbers of buyers and sellers transacting so as to not to individually affect prices, may be governed under “*light-touch regulation*” where a robust legal framework exists. But this assumption of free and open financial markets where private goods are traded ignores the presence of other goods’ types, such as club goods, common-pools and public goods. These property-rights structures require regulatory and governance mechanisms which differ from those used for private goods (E. Ostrom, 2010; McGinnis, 2007).

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<sup>2</sup> To simplify the discussion, this paper employs a purposefully-broad view of banking which financial economists may see as financial intermediation.

In order to compete, financiers strive to create new financial products and self-design new organizational structures (Eccles & Crane, 1988; Hayes, 1979; Selmier, 2013). This striving to financially-engineer financial products and financial intermediation arrangements has occupied the banker's mind for centuries (Chapman, 1984; Kennedy, 1987; Selmier, 2013). An editorial in *The Statist* complained (1888, quoted in Chapman, 1984: 157), "The great English financial houses . . . are superseded by Continental methods... [where] syndicates, groups and combinations of bankers have long been common." Financiers have pursued financial engineering in order to obtain higher returns and lower risks, and Cerny (2014) and Selmier (2014) have each argued that the result has been a proliferation of club good structures in modern investment finance.

In fact, we find financial products and financial intermediation arrangements which map into each of the four goods archetypes based on their inherent property rights,<sup>3</sup> as shown in Table 1 below. In their paper "Financial Risk as a Good", Selmier, Penikas, and Vasilyeva (2014) proposed that risk comes embedded in financial products and should be seen as a kind of good. But what type of good is it? In small doses, financial risk may be consumed by an individual actor and so typed as a private good. But, as the impact of a specific financial risk grows, financial risk transmutes<sup>4</sup> into a club good. As the impact, *whether real or potential*, spreads further to a systemic level, financial risk grows to become a common-pool and possibly a public good [or better put, a public bad]. They argue this effect of "socializing risk" means that economic actors are explicitly "not excluded *even if they wished to be excluded*" (Selmier, 2013:

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<sup>3</sup> This two-by-two typology matrix is developed from the public choice literature (McNutt, 1999; Ostrom & Ostrom, 1977; Weimer & Vining, 2005). It types goods into four categories through property rights constituents of rivalrous consumption and excludability. *Rivalry* increases as the good is uniquely consumed by a single economic actor. *Excludability* is determined by the provider's capacity to impose conditions and requirements which restricts ownership of, or access to, that good.

<sup>4</sup> Selmier, 2014, defines this as a process "in which actors employ technology and developments in theoretical finance to package financial goods into new financial products whose resultant property rights shift their good type in this typology matrix."

5-6). Drawing on Schlager & Ostrom's (1992) argument that property-rights structures in natural resource common pools are best viewed as tiered, they show that all economic actors bear risk but that "principals in securities markets, such as dealers, could restrict access to the 'good' that is risk" (Selmier et al, 2014).

*Insert Table 1 here*

The public goods nature of banking finance may extend beyond financial risk. Recognition of the benefits to the public good, embodied in sayings such as "finance is the handmaiden of industry," was noted by Polski (2003: 42):

"The earliest American banks were chartered because they were considered as 'some sort of public utility,' or in the more mystical terminology of the 18th and 19th centuries, 'public blessing'."

Cerny (2012) argues this public goods nature of finance has not disappeared; rather, the importance of its nature had been brought front and center in the recent financial crisis. Summarizing this train of thought, Selmier (2014) argues that modern financial products and financial structures may be categorized into *any* of the four goods archetypes—private, club, common-pool resource, and public goods—based on their embedded property rights. The unique properties of club good structures enable members to better control risks while sharing of profits. The hierarchical ownership structure engineered into a club may also concentrate profit at the higher tiers of the club's management. This means characterizing finance as an efficient market ignores how non-private goods in finance are structured, transacted and owned or shared.

Of course, effective financial governance involves managing crises as well as good times. Barth, Caprio & Levine (2005: 26) observed that "Banking crises are the train wrecks of finance", but the wreckage does not stop in the financial environment. Train wrecks involve more than just trains and their tracks: environmental damage and political conflict may result. While the environment of banking is a virtual one, environmental disasters occurring in that

virtual environment bleed into the real economy and indirectly affect natural environments. “Finance is the *infrastructure of the infrastructure*—the brain and nervous system of any economy” (Cerny, 2010: 246). So, if environmental disasters occur in that virtual environment of banking (Bhidé, 2009; Nesvetailova & Palan, 2013; Reinhart & Rogoff, 2009), is it not fair and logical to ask that banks act in an “environmentally responsible” manner?

Environmentally responsible management (ERM) practices involve the acceptance of responsibility by MNEs (multinational enterprises) for the externalities caused by their business practices and their adoption of business strategies and tactics which seek to eliminate, minimize or offset those externalities. These externalities arise because the costs of development, production, distribution and servicing of an MNE’s products do not encompass all costs involved. Some costs are pushed outside the MNE and borne by society. We give different names to these resulting costs, including environmental degradation, pollution, decline in quality of life, health costs. Unchecked, those costs may result in environmental imbalance and, sometimes, disaster. It is natural that the analytical lens of ERM has been applied to the natural environment in which MNEs operate (Kolk, 2010; Madsen, 2009; Rugman & Verbeke, 1998). To push ERM beyond the natural environment of MNEs into the virtual environment of banking requires us to determine the nature of that virtual environment, to choose an appropriate analogy, and then to map the demands of environmental stewardship. We might work on the first two requirements concurrently, as the analogic choice can be made easier by comparing financial resources- capital- with different natural resources.

### *Comparing Natural resource-based and Virtual Financial Environments*

To introduce natural environmental analogies, let us look at an example of bank governance theory which considers offshore banking as constituting pollution havens. While

this example may seem robust, there are four weaknesses in this analogy (see Table 2):

1. The mechanism is undefined. Is the production process itself causing pollution? That would mean offshore finance is by nature pollution-producing, which has been a difficult argument to make for service industries. Or is the product itself to blame? That would mean that the product causes pollution in and of itself. Again, quite difficult to substantiate. As a comparison, examples of industries which cause pollution through both production process and product would be coal mining or auto manufacturing.
2. Continuing this idea, the argument has been made that offshore banking in and of itself does not produce pollution, but rather overuse of offshore banking causes negative externalities. But this pollution outcome is very dependent on legal, regulatory and governance structure of the offshore banking center. These prior institutional conditions of the environment are easily changed.
3. Also problematic is the highly episodic nature of so-called pollution events in offshore banking, which might be described as both temporal and causal in nature. These episodes may occur not only through exogenous or endogenous shocks to the system. Exogenous changes occur offshore which may improve governance or involve taxation elsewhere, but may be more accurately described as progression in governance rather than a shock.<sup>5</sup>
4. In short, perhaps pollution is not the right term, or at least a sufficiently-comprehensive term. That is to say, this conceptualization is incomplete as it views banking actions as polluting without allowing for a more forthright approach to proactive governance, which some banks already pursue.

*Insert Table 2 here*

Stepping back to view finance in broader terms as a virtual environment gains us better traction. A virtual environment analogy encompasses the significant complexity arising through the number and variety of actors, and the array of property rights structures which encompass all four goods types in finance. Appendix One provides a table comparing three natural resource-based environments (forests, fisheries and air) with the virtual world of finance across four fields: “environment” attributes, products produced directly or indirectly, tipping point onset and equilibria notes, and measures of environmental damage. There may be considerable differences within each natural environment case in size terms but every case faces issues of setting the

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<sup>5</sup> Reliance on such heuristics leads to problematic analogs (Dearing, Braimoh, Reenberg, Turner & van der Leeuw, 2010).

boundaries of an environment, including cases in financial environments. However, these three natural resource-based environments do not provide the robustness required for a thorough analogical comparison. First, boundaries of financial environments vary greatly, ranging from local to global. Generally, air “boundaries” are viewed in either municipal or global terms; fishery boundaries limited to specific water bodies or fish migration patterns; forests do scale from local to regional. This comparison difficulty between virtual and natural environments may be better seen through specific environmentally irresponsible actions, where effects on forests and fisheries are typically more localized,<sup>6</sup> while air-linked environmentally irresponsible actions can be “scaled” from individual to large-scale just as in the financial environment. While air might initially seem to be the stronger analogy than fisheries or forests, the lack of a discernable product based on the resource complicates the comparison. In summary, that environment must be sufficient robust to encompass a similar spread of economic actors, geographic spread, and types of goods and property rights structures which forests, fisheries and air do not provide.

Woolley & McGinnis (1999: 578) highlight why watersheds may be the logical analogy:

“Watershed policy is not just about water and water use.... Because watersheds cover the entire landscape- terrestrial and aquatic-a whole range of cultural, biological, geographical, and ecological factors affecting watershed ecosystem health and native species diversity should be taken into account in the policymaking process.”

The nature of financial risk fits well into the watershed analogy because, in both cases, risk can be viewed as an environmental balance subject to severe disturbance through environmentally irresponsible management (Herzig & Moon, 2013; Olsson, Gunderson, Carpenter, Ryan, Lebel, Folke & Holling, 2006; Strike, Gao & Bansal, 2006). As described in the next section, the nature of a watershed enables discussion of the inherent complexities of financial markets.

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<sup>6</sup> Globally-important forests like the Amazon basin provide an exception not discussed in this paper.

## **Watersheds as an Appropriate Analogy for Financial Markets**

“A watershed is a special kind of common pool resource: an area defined by hydrological linkages where optimal management requires coordinated use of natural resources by all users.”  
Kerr (2007: 89)

Substitute the terms *capital market* for *watershed*, *financial* for *hydrological*, *capital* for *natural resources*, and the analogy fits for financial markets first pass. But let us delve more deeply into comparative aspects. First, note that Kerr highlights the common pool nature of a watershed. This paper considers watershed *governance* as an analog to financial markets’ governance. Their socially-engineered natural and virtual environments consists of all four goods archetypes even though the fundamental nature of the resource itself may differ.<sup>7</sup> Table 3 below compares watersheds and financial markets across four general measures: Environment (consisting of “hydrology”, actors, and make-up of environment); Governance (consisting of the nature of governance and institutions and available information); the Tipping Point (consisting of its nature and how return to equilibria may occur); and Environmental Damage (which involves irresponsible actions, “discharge”, and a note on what constitutes pollution).

When considering Table 3 and the discussion below, it is important to also consider the institutionalized nature of financial markets and watersheds as I describe them. I only consider watersheds already utilized by humans who have attempted to construct a governance structure. Watersheds still in a natural state are not considered here. I presuppose that complex human/nature interactions encompassing watershed governance are evolutionary in a long time sense, as discussed by Dearing et al (2010).<sup>8</sup> Management principles and design rules mentioned below rely in part on Cox, Arnold & Villamayor Tomás’ metaanalysis of studies examining natural resource management design (2010). Employing these concepts, I propose

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<sup>7</sup> Water is considered a common pool to access is governed under *usus* and *usus fructus*, loosely, rights of use. Capital may be privately owned, unlike water.

<sup>8</sup> Selmier (2013) looks at the development of investment banks in a similar evolutionary path over 2 centuries.

seven points why watershed governance is a fitting analogy to financial market governance:

**1, scaling** the watershed analogy from small to very large fits well with financial markets [community to regional]. The comparative basis is strong in part because the resource in question flows downstream and may be utilized by users who have rights or access to the water (capital). Both watersheds and financial markets range in size partly due to the complexity of drawing boundaries. Complexity of boundary-setting exists in both cases (V. Ostrom, 1953; Woolley & McGinnis, 1999: 579-80). Boundary issues complicate governance of watersheds and financial markets in ways similar and differing. “Like the choice of boundaries, the choice of decision making arrangements is a political choice” (Blomquist & Schlager, 2004: 106).

Water (capital) grows in size downstream as the rainfall catchment areas increase in size (or as banks increase capital available through the multiplier effect<sup>9</sup>). There may be fewer barriers to global nature of financial markets during economic expansion than there is for riparian systems like watershed.<sup>10</sup> This is a limitation of the watershed analogy, as riparian systems drain into oceans and so global comparisons are limited.<sup>11</sup> While international conflict over watersheds and international finance are often mentioned, in fact very few wars have been fought *over* water (Wolf, Yoffe & Giordano, 2003, but c.f. Bernauer, 1997) or *over* banking. As with water, capital is a necessary condition for international conflict as bankers have long funded war (Buchinsky & Polak, 1993; Kennedy, 1987). Some might argue that a kind of Kantian Peace may be won through capital or water (Wolf, 1998), as Wolf, Yoffe & Giordano (2003) find robust institutional capacity mitigates international conflict over watersheds.

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<sup>9</sup> Under a fractional banking system, banks may lend out available capital up to their reserve requirement as mandated by their central bank. For instance, Bernanke, Gertler & Gilchrist (1996) examine how a “financial accelerator” mechanism works through fractional lending. While not pursued in this paper, their analysis whereby financial deceleration brought about by tightened lending requirements imposed by a central bank may be analogous to the effects posed by a drought on a watershed.

<sup>10</sup> As supported through interest rate equalization across national lines.

<sup>11</sup> Again, the Amazon basin is an example of a complex exception not discussed in this paper.

*Insert Table 3 here*

2, watersheds and financial markets each consist of **a variety of users**, ranging in all sizes and including private, public, consortia, combinations of private/public actors.

3, hydrologic [capital] resources are **tapped for many different uses**. Water is to life as capital is to business; without the first, the second does not exist. In the simplest terms of a managed watershed, water is used for irrigation. This leads to discussions of usage and barter rights amongst members of the watershed's community. But the hydrology of larger watersheds support economic activity ranging from natural resource extraction to manufacturing to urbanites' lawns. Kerr (2007: 91) explains that while one might think

“that upstream-downstream hydrological relationships within watersheds are just externalities that can be managed through such approaches as Coasian bargaining, command-and-control, or taxes and subsidies,”

in reality that complexity can rarely be managed so simply due to the many interested parties.

4, complexity of uses and access rights leads the variety of actors to construct (financially-engineer) **property rights structures consisting of all four goods archetypes**: private, club, common pool, and public in large-scale cases (For watersheds, see Kerr, 2007; Lansing & Miller, 2005; Woolley & McGinnis, 1999. For financial markets, Cerny, 2014; Selmier, 2014; Selmier, Penikas & Vasilyeva, 2014). Blomquist & Schlager (2005: 102):

“find that as a unit of organization, “the watershed” does not resolve fundamental political questions about where the boundaries should be drawn, how participation should be structured, and how and to whom decision makers within a watershed are accountable...”

5, and so this complexity of property rights often pushes larger watersheds toward **polycentric governance through a range of public-private arrangements**. Consider just one complication in watershed governance, the tricky question of land resources and tenure (by definition, immovable) in contrast to water rights, which may prove difficult to govern as ground

and stream water flow onto other properties. As an example, Villamayor Tomás (2014) finds a complex, multilevel governance system with water cooperatives, government agencies, individuals and companies working together to manage scarce water resources in the Pyrenees. Blomquist & Schlager sketch similar arrangements in which (2005: 108):

“The polycentric arrangements commonly observed in the United States and elsewhere typically involve a mixture of general-purpose governments organized around some kinds of communities of identity, interest, and place and designed to make trade-offs across policy topics, and special-purpose governments organized around policy topics and other kinds of communities of identity, interest, and place.”

Similar efforts exist in institutionally-robust financial markets through a polycentric combination of self-governing organizations, public-private arrangements, and regulatory bodies all commented upon by a vibrant press and watchful citizen base. As noted in the following section, these efforts could be strengthened through watersheds’ examples.

6, under this polycentric governance model **governmental, private sector and mixed agents seek to support and manage [sustainable] exploitation** in each. This point sits upon the foundation of the previous four: that watersheds (capital markets) consist of **a variety of users, who tap (the resource) for many different uses**, and in so doing, construct **property rights structures consisting of all four goods archetypes** which pushes better governance structures toward **polycentric governance through a range of public-private arrangements**. Experts and expertise are relied upon to advise these agents in sustainably exploiting the resource. In both cases, “The politics of watershed (financial markets) policymaking includes value-based assessments over competing priority actions and scientific issues” (Woolley & McGinnis, 1999: 591, “financial markets” added by this author). But there is a crucial intermediation difference between watersheds and financial markets, in that financial institutions are intermediaries employing enormous informational advantages while actively engaged in exploiting the resource in question (Greenbaum & Thakor, 1995; van Horne, 1985; Rajan &

Winton, 1995; Selmier, 2013). This informational asymmetry empowers bankers to pursue their own agenda.<sup>12</sup> Again, Woolley & McGinnis, (1999: 579) describe watershed policymaking in terms familiar to financial market observers:

“Overall, several factors may influence the impact of scientific information in watershed policymaking, including incomplete information, political entanglement, naive faith in science, and the effects of multilevel government.”

### **7, comparisons of causes and results of environmental degradation are robust**

between watersheds and financial markets. Tellingly, proximity to resources, whether hydrologic or capital, does not create better use of resources, but sometimes leads to disregard or a simple lack of understanding of consequences (for watersheds: Blomquist & Schlager, 2004: 106-8; Kerr, 2007; Lansing & Miller, 2005. Financial markets: Acharya & Richardson, 2009; Bhidé, 2010; Woolley, 2010).

*Insert Table 4 here*

Table 4 summarizes these seven points. Drawing from these comparative points, the following section proposes four lessons from watershed management which may improve financial market governance.

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<sup>12</sup> In general, international business terms, Rugman & Verbeke (1998) propose that MNEs are able to exploit firm-specific advantages to capture the benefits while not paying all costs.

## **Environmentally-Responsible Management in Finance- Applying the Watershed Analogy**

*“Our bankers are the stewards of our whole intricate credit system...[T]heir sense of obligation and their feelings of responsibility for the maintenance of that system in a high state of adequacy and efficiency are as lofty as the motives of other professional men.”*

*Saturday Evening Post editorial of December, 1928*

The stewardship concept in banking is not a new idea, but rather the revival of an old one. Before the Great Depression brought about a great change in sentiment, bankers in many countries were viewed as the epitome of prudence and financial responsibility. This view was due in no small part to the importance of reputational capital and the ever-present danger of a banker’s bankruptcy should one misstep (Chapman, 1984; Morrison & Wilhelm, 2004). As reputational capital declined in importance at the expense of financial capital and expertise, the sense of stewardship declined as well (Bhidé, 2009; Selmier, 2013; Woolley, 2010).

Several key issues complicate financial market governance when compared with watersheds: first, banks act as intermediary institutions of a private nature,<sup>13</sup> which is a rare institutional event in watershed management. Second, financial intermediation works in part because information is proprietary to banks (Boot, 2000; Greenbaum & Thakor, 1995; Morrison & Wilhelm, 2004). So policy shifts must at least partially protect banks’ proprietary information or banking will not function. Hence some informational asymmetry will continue to exist. Third, financial market participants *actively seek* to extend and cross boundaries in financial markets as part of their business operations (van Horne, 1995; Palmer, 2012; Selmier, 2014). Fourth, “discharge” can be described, monitored and measured in watersheds, but in financial markets it is a fuzzy, hard-to-measure concept. Fifth, the self-contained nature of watershed community membership is somewhat different from that found in financial markets. That is to say, members of watersheds generally know they are members; some “members” of financial

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<sup>13</sup> Again, for simplicity I purposefully employ a very broad view of banking which financial economists may see as financial intermediation broadly defined. Note there are public banks involved in financial markets as well.

markets find out their membership when financial crises strike.

I propose four lessons from watershed management which may improve financial market governance and help reinvigorate stewardship in banking:

1. *Addressing public bads arising from informational asymmetry*

Proprietary information regarding clients and trading positions enables banks to protect their clients and to shoulder financial risks required of financial intermediaries (Boot, 2000). Without accepting those risks, and concurrently maintaining some informational secrecy, modern banking would simply not work (Greenbaum & Thakor, 1995; van Horne, 1985). But banks sometimes transform their intermediation role in less productive ways. In the recent crisis,

“Instead of acting as intermediaries between borrowers and investors by transferring the risk from mortgage lenders to the capital market, the banks became primary investors.”  
Acharya and Richardson (2009: 200)

Informational advantage heightens the environmental risks created by banks. As social actors with citizenship responsibilities, banks must realize that environmental responsibility is not simply an aspect of corporate social responsibility; it is one of the most important aspects. ERM requires the bank to recognize the risks imposed on society (Selmier et al, 2014) and recognize that its “discharge” flows downstream (Acharya & Richardson, 2009; Goodhart, 2010; Woolley, 2010).

While easy to request that banks recognize externalities, this will only lead to better governance where members of the virtual environmental communities recognize, monitor, and publicize effects of the “discharge”. Woolley & McGinnis (1999: 584) quote a landowner in a watershed which could not successfully organize, “There is nothing broken, so why fix it. We are against the notion of restoration and prefer the term enhancement.” The virtual environment in finance suffers from such attitudes until the crisis comes. Then comes again.... And again.

2. *Monitoring helps to determine externalities and encourage ERM*

Active monitoring moves a virtual financial environment's members toward calculating the actual cost of risk and other externalities. Regulatory capture issues may be alleviated by encouraging non-government agents to monitor. Cox, Arnold & Villamayor Tomás (2010) point out that extending local-level community action to geographically-broader, institutionally-deep situations may be difficult. Individuals may lack the time and resources to successfully or completely monitor. But in the case of virtual financial environments, the population of private monitors includes large, resource-endowed institutions (Finance: Herzig & Moon, 2013; Rajan & Winton, 1995. Natural environments: Beever, Mattsson, Germino, Post van der Burg, Bradford & Brunson, 2014; Dearing et al, 2010; Olsson et al, 2006).

For monitoring to work, the monitors must not only watch for their own interests to be contractually fulfilled, but also that an environmental balance is struck. A proactive approach to ERM can be encouraged, one in which banks' actions are characterized not by the absence of bad behavior, but by the presence of good behavior (Strike, Gao & Bansal, 2006; also Porter & van der Linde, 1995). Governmental and private monitors can encourage banks and bankers to develop ERM practices into a key part of their strategies (Oh, Park & Ghauri, 2013). In this way, banks can and should link ERM and CSR concepts into an integrated strategy of stewardship. Porter & van der Linde (1995) argue that, by adopting and supporting strong environmental regulation, MNEs may actually enhance their firm-specific advantages. Banks may adopt a similar strategy to gain a similar advantage (Oh, Park & Ghauri, 2013).

### *3. Import governance ideas from watersheds into financial markets*

A well-developed environmental governance concept which applies well in finance is adaptive management. Adaptive management brings the concept of constantly reengineering policy based on iterative loops as previous policy is implemented, evaluated, reengineered and

optimized in order to implement a better-targeted policy (Dearing et al, 2010; Olsson et al, 2006; Villamayor Tomás, 2014). While these ideas exist in financial market governance, they are often ad hoc from the regulatory side (Bhidé, 2010; Selmier, 2014; Woolley, 2010). Financial intermediaries constantly reengineer their products and policies, which sometimes adds the turbulent nature of financial markets. Olsson et al's (2006) analysis of socio-ecological water systems in which rapid, transformational change requires leadership to attain a successful new system is very apt. Their point that leadership may or may not deliver the goods, but that a community sense will improve outcomes, is quite applicable in financial markets.

#### *4. Fuzzy boundaries sometimes helps in governance*

In an odd way, fuzzy boundaries may help in banking governance. To understand why, we may consider Rugman and Verbeke's (1998) warning that MNEs may attempt to capture the benefits of their firm-specific advantages while not paying all costs. This danger may occur when firms are "Being good while being bad," as Strike, Gao & Bansal (2006) write. Rugman & Verbeke (1998) argue that an ERM-shirking danger arises because few industrial or financial institutions are truly global, so regional governance is critical, regional support crucial, but regional shirking potential still possible. That is to say, MNEs will take advantage of their regional focus to evade regulation and governance.

But banking and financial governance has become increasingly global (Goodhart, 2010, Young, 2013). At local, national, regional and global levels there are many eyes on banking, ears attuned to what bankers and financier do. This will lead to better ERM among banks as the incentives/reasons for ERM increase with stronger global governance (Bhidé, 2009; Woolley, 2010).

### **Limitations to these ideas**

“No manner of councils and committees in which each of the constituents retains its particular value orientation and operating assumptions can develop an integrated resource program.”  
V. Ostrom (1953: 493)

This paper has argued that financial markets are a virtual environment, and so banks and bankers should practice responsible environmental stewardship. I argued that banks should proactively apply business ethics concepts of CSR and ERM (corporate social responsibility and environmentally responsible management). I proposed using watershed management as an analogy to improve governance in financial markets. However, with any analogy there are inherent complications and difficulties. Dearing et al (2010) note that:

“... analogs prove problematic for systematic assessments of current and future land systems, especially as boundary conditions change,”

and boundary conditions constantly change in finance.

In this paper the analog is two-tiered: first, I describe the virtual environment of banking and finance, and then suggest managed watersheds as financial market proxies. Discussing their limitations help to frame challenges in the social science analytics herein, as well as provide opportunities to address those limitations.

There are limitations to the concept that the banking environment is like a virtual natural environment. Firstly, the resource comparison of capital versus hydrologic suffers from the fact that capital has a circulatory nature. Once invested through a transaction, the capital is then employed by the receiver (usually seller) to invest or spend, and this cycle continues. Hydrological resources in watershed do, eventually, circulate as the water is taken up into the atmosphere and precipitated. But the circulatory nature is not as geographically- limited, temporally- quick or institutionally- controlled as with capital. In a watershed, downstream flow alone determines the amount of hydrological resource availability, post-precipitation; in financial

markets, the supply of capital is influenced by central banking authorities and credit-granting financial intermediaries like banks. Secondly, in broader evolutionary terms, banking environments change at a very fast pace. Watersheds may also change at incredibly rapid rates, but then settle into a new human-engineered equilibrium of sorts barring environmental upheaval (Lansing & Miller, 2005; Villamayor- Tomás, 2014). Members in a watershed community *do not seek continual change* in order to compete, but rather seek to employ hydrological resources optimally and so engineer the watershed environment. Members in the virtual environment of a banking community *seek continual change* in order to compete, and through those changes seek to employ capital resources optimally. So bankers continually reengineer their virtual environment. Thirdly, banks and bankers may be seen as acting in many different environments which are not only “natural”, but also social, competitive, ideational. This limitation may be less that first meets the eye. As Woolley & McGinnis (1999: 580) explain, even

“watershed policymaking does not, as the concept may appear to claim, incorporate all the relevant water-related and landscape interdependencies.”

This leads us into limitations encountered using watersheds as governance analogies for virtual financial environments. Firstly, there is a significant difference in legal rights between the two cases. With hydrological resources, access rights are dependent, or at least influenced, by land ownership. The complex, contentious, long-term negotiated access rights to the Colorado River have been analyzed for decades (V. Ostrom, 1953: 486, 489) and are still contended. While access to capital is certainly contended as well, there are not legal rights per se to *access* this resource. Rather, capital may be privately owned, while water may only be appropriated for use, not owned (see fn 7). Secondly, the nature of state/regional, national and multinational governance seems very different. Banking and financial markets have highly formalized government or multinational organizations and regulators, while watershed

governance may be more ad hoc. Some institutions of watershed governance conform to the watershed at hand, often developing with the gradual economic development of the watershed. While institutions such as the E.P.A. provide a standardized approach in watershed management, the remit of the E.P.A. is broad in scope and often limited in most watershed cases.

Thirdly, as noted earlier there are conceptual and practical difficulties of comparing tangible externalities like soil degradation and pollution with intangible externalities such as excessive risk and crisis-inducing fraud. Some of these issues relate to tipping points. As an example, when does fraud move from losses experienced by a small number to a systemic issue, and is this only identifiable post hoc?

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<i>Table 1: Four archetypes of goods by property rights</i>		
<i>Consumption</i>	<b>Rival</b>	<b>Non-Rival</b>
<b>Excludability</b>	Private Goods	Club Goods
<b>Non-Excludability</b>	Common-Pool Resources: <i>McNutt notes this creates a “Private Externality”</i>	[Pure] Public Good: <i>McNutt notes this creates a “Public Externality”</i>

Sources: from Selmer, Penikas, and Vasilyeva (2014). Adopted and adapted from McNutt (1999: 930, tables 1 and 2); Ostrom and Ostrom (1977).

<i>Table 2: Weaknesses with the Pollution analogy in Offshore Finance</i>			
	<b>Name</b>	<b>Description</b>	<b>Finance specific issue</b>
<b>Mechanistic</b>	<b>1. Determining</b>	Production process, or product, or both causes pollution	Unclear as to how “pollution” is caused.
	<b>2. Threshold</b> <i>[tipping point]</i>	A threshold is reached at which pollution occurs	Very unclear when this occurs; clearly prior conditions of legal structure influence outcome.
	<b>3. Temporal &amp; causal</b>	Episodic onset can be traced to specific stimuli.	Catalysts are quite difficult to pick out sometimes.
	<b>4. Terminology limitation</b>	“Pollution” describes an unwanted externality.	This analogy in finance looks only at occasional, episodic phenomena which are defined post hoc.

Source: author’s description.

<b>Table 4: 7 Points for Watersheds as the Analogy to Financial Markets</b>		
	<b>Point</b>	<b>Note</b>
1	scaling the watershed analogy from small to large fits well	But riparian systems drain into oceans and so truly global comparisons are limited
2	a variety of users	Ranging in all sizes and including private, public, consortia, combinations of private/public actors
3	resources tapped for many uses	Water is to life as capital is to business; without the first, the second does not exist.
4	property rights structures of all four goods archetypes	But financial markets skewed toward club goods. only risk is a common pool- [thus far]
5	polycentric governance through many arrangements	“organized around some kinds of communities of identity, interest, and place” *
6	agents seek to support & manage [sustainable] exploitation	financial institutions have informational advantages and are actively engaged in exploiting the resource
7	comparisons of causes and results of environmental degradation are robust	But measurement of “discharge” in finance is difficult.
Source: Author’s conception		* Blomquist & Schlager, 2005: 108

*Note: Table 3 appears on the next page.*

**Table 3: Watersheds and Financial Markets- Comparing Environments**

		<b>Watersheds</b>	<b>Financial Markets</b>
<b>Environment</b>	<b>“Hydrology”</b>	“hydrology”-based, in terms of water & capital; capital is liquid; Altitude: water, and capital, flow downward. But capital “circulates”. Water typically increases in lower levels of riparian system; capital does as well, through multiplier effect	
	<b>Actors</b>	all sizes, private, public, consortia, combinations of private/public	
	<b>Make-up</b>	“natural,” socio-ecologically engineered Biota-complete, but Anthropocene-influenced	manufactured, virtual Anthropocene-only
	<b>Goods</b>	Consists of all four goods archetypes: private, club, common pool, public in large-scale cases	
<b>Governance</b>	<b>Nature of</b>	Finite nature of resource often misunderstood Attempts to claim more private goods nature than may actually exist Stewardship requirement: each environment can be “ruined”	
		Hierarchical in geographic terms, often with political power influence	Hierarchical in network terms, always with political power influence
	<b>Institutions</b>	Rarely a central institution controlling “taps”	Always a central institution controlling “taps”, <i>de jure</i> . <i>De facto</i> nature more difficult to define
		Nearly always overlapping governance; polycentric	Varies from single regulatory body [i.e., FSA in UK] to polycentric approach
	<b>Information</b>	Symmetric or Asymmetric, varies with watershed Generally more dispersed, concentration in outside experts	Asymmetric: financial intermediaries with finer-grained info Concentrated: information stores in financial intermediaries
<b>Tipping Point</b>	<b>Nature of</b>	Crisis-nature may range from slow to quick,	Crisis-nature is typically quick onset
	<b>Return to Equilibria</b>	Equilibria can be restored; multiple equilibria possible through human-modified environment	Equilibria can be restored; multiple equilibria dependent on “constructed environment”
<b>Environmental Damage</b>	<b>Irresponsible Actions</b>	Forests: land-clearing; planting invasive species; introducing pests/blight Water: Overfishing; sewage; agricultural runoff Land: degradation	Creating systemic risk; fraudulent behavior; hiding information
	<b>“Discharge”</b>	See below	Is a fuzzy concept at best; What is monitored?
	<b>Pollution is</b>	Chemicals, particulates, agricultural chemicals, Particulates, NO <sub>2</sub> ,	<i>difficult to define</i>
<b>Note</b>	1. Assumes CPR & public goods aspects of finance, club good structures within financial industry. Risk as a common pool. 2. Assumes Anthropocene era, hence humans “construct” environment to some extent. This includes constructive & destructive environments. 3. Environments artificially defined, assumes discernible boundary/dividing line is imposed but still subject to political influence.		

*Appendix One: Comparing the Virtual Financial & Natural Resource-based Environments*

		<b>Financial World</b>	<b>Forests</b>	<b>Fisheries</b>	<b>Air</b>
<b>“Environment”</b>		Boundary issues occur in each environment			
		Localized but scales up as moving left to right			
<b>Pro-ducts</b>	<b>what</b>	Financial	Wood, environmental benefits	Fish, marine, environmental benefits	environmental benefits
	<b>Nature of</b>	direct	Direct & derived	Direct & derived	Only derived
<b>Tip-ping Point</b>	<b>Nature of</b>	Quick, Crisis-nature	Quick to slow	Typically slower	Slower to very slow
	<b>Equilibria</b>	Equilibria can be restored; multiple equilibria dependent on “constructed environment”		Equilibria more difficult/impossible to restore; “constructive environment” difficult to achieve	
<b>Environmental Damage</b>	<b>Environmentally Irresponsible Actions</b>	Creating systemic risk; hiding information; fraudulent actions	Clear-cutting; planting invasive species; introducing pests/blight	Overfishing; Seeing rivers and seas as sewers; human nature to wash with water	Venting pollutants into air; burning of fossil fuels; land-clearing; construction; transportation
	<b>“Pollution” caused by</b>	Direct effect of product creation and extraction		Indirect effect of industrial or agro-related activities	
	<b>Pollution is</b>	<i>difficult to define</i>	Air, water and soil-based	Chemicals, particulates	Particulates, NO <sub>2</sub> , etc
	<b>Pollution leads to</b>	Toxic financial products → systemic effects	Over- & clear-cutting → watershed destruction, forest collapse	Dumping of pollutants → biochemical collapse; overfishing → fishery collapse [?]	Dumping of pollutants → biochemical collapse; overfishing → fishery collapse [?]
<b>Notes</b>	<ol style="list-style-type: none"> <li>1. Assumes CPR &amp; public goods aspects of finance, club good structures within financial industry. Risk, as a common pool, enables environmental approach.</li> <li>2. Assumes Anthropocene era, hence humans “construct” environment to some extent. This includes constructive &amp; destructive environments.</li> <li>3. Environments artificially defined, assumes discernible boundary/dividing line.</li> <li>4. ERM = environmentally-responsible management</li> </ol>				