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**Structure of a Transnational Human Security Network:
The Response to the Indian Ocean Tsunami of 26 December 2004**

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Abstract: This paper uses the methods of social network analysis to discover the structural patterns of cooperation that arose in response to a global human security problem. It does this by mapping compulsory and institutional power relations among actors of the construction of a human security transnational cooperative response network—the response to the Indian Ocean tsunami of December 26, 2004. By mapping the relationships at the system level of world politics, including individual states as well as intergovernmental organizations (IGOs), transnational nongovernmental organizations (NGOs) and/or think tanks, and transnational corporations (TNCs), this paper finds a third relation among these actors, namely, structural power. It also demonstrates how a new way of thinking about the constitution of system level world politics can produce knowledge not available to traditional methods by finding two striking results: first, the role played by an organization cannot always be predicted by reference to its attributes, and second, depending on the context, organizations of different types will play similar (structurally equivalent) roles. Finally, this paper compares the network formed in response to this disaster with the network that formed after a disaster of similar magnitude in the past.

*God is our refuge and strength, a very present help
in trouble.
Therefore will not we fear, though the earth be
removed, and though the mountains be carried into
the midst of the sea;
Though the waters thereof roar and be troubled,
though the mountains shake with the swelling
thereof. Selah.*

*There is a river, the streams whereof shall make
glad the city of God, the holy place of the
tabernacles of the most High.
God is in the midst of her; she shall not be moved:
God shall help her, and that right early.
The heathen raged, the kingdoms were moved: he
uttered his voice, the earth melted.
The LORD of hosts is with us; the God of Jacob is
our refuge. Selah.*

*Come, behold the works of the LORD, what
desolations he hath made in the earth.
He maketh wars to cease unto the end of the earth;
he breaketh the bow, and cutteth the spear in
sunder; he burneth the chariot in the fire.
Be still, and know that I am God: I will be exalted
among the heathen, I will be exalted in the earth.
The LORD of hosts is with us; the God of Jacob is
our refuge. Selah.*

-- Psalm 46, The King James Bible

Introduction

The words of Psalm 46 clearly illustrate the scope and power of a natural disaster. As well as putting in perspective humanity's relative importance in the world, the psalmist also implores God's protection and foresees the peace that God's will imposes. One such example of peace after desolation occurred in the aftermath of the Indian Ocean tsunami of December 26, 2004. The global response to this regional disaster demonstrated cooperation in several different ways, from the marshaling of resources to the institutional collaboration to provide assistance to the afflicted.

The political subject to be explored in this paper is the shape and construction of a human security network in a case study of the tsunami disaster response network. The patterns of cooperation that arise to meet transnational problems in security will be mapped and explained.

For the purposes of this investigation, “[t]wo agents cooperate when they engage in a joint venture for the outcome of which the actions of each are necessary, and where a necessary action by at least one of them is not under the immediate control of the other” (Gordenker, et al. 1995). The concept of networks in international relations assumes that social structures such as those arising from cooperation matter more in explaining outcomes than do individual attributes, and are equally as important as material resources. It assumes that there is no central institution or idea that controls international relations (even in a specific issue area). It also assumes that according to the issue area, actor relationships will change. The unit of analysis will be the network as a whole; at the macro level (the system level of world politics), the network consists of the pattern of formal and informal interactions between states, intergovernmental organizations (IGOs), transnational nongovernmental organizations (NGOs), transnational corporations (TNCs), and individual people.

The evolution of cooperation to respond to the South Asian tsunami began with an event, a tsunami in the Indian Ocean. The response network that was created was not started from scratch, however: there were communities of states, intergovernmental organizations, and nongovernmental organizations that already existed. To create the response network, not only did these pre-existing groups have to negotiate structure and authority amongst themselves, but they also had to incorporate many new groups who wanted to assist.

System-level networks seem to be primarily concerned with policy development, so the question that needs answering here is “Who makes the decisions?” For example, in the case of the tsunami, this refers to determining the overall shape of the global response: would aid offered be coordinated on a state-by-state basis, by an intergovernmental agency, or some other actor, or some combination of the above? Where was power (the ability to make decisions that are binding on others) exercised?

Theoretical Context

The theoretical context in which this work is situated is largely within the constructivist school of international relations. Unlike realists or liberal institutionalists, who would expect states or intergovernmental institutions to take the lead in constructing a response to an event or problem, constructivists allow for situations of complex interdependence in which other actors, or ideas, may be more important.

For years, the dominant paradigm in the American academic field of political science has been realism, which is now under attack. Realism depends on power and self-interest in survival for explaining the actions of states, which are the units studied. Realism, especially structural realism, as defined by Kenneth Waltz (Waltz 1979) says that the behavior of functionally undifferentiated states is based on their positions in the system – the distribution of power capabilities. However, this theory leaves out a great deal. For example, realism assumes one type of actor, the state; and one organization type for the international system, which absent hierarchy is anarchic. Structural realists assume that anarchy generates a self-help environment, where the paramount interest of

the state is survival. This makes for an elegant model, but it is one that resembles reality not in the slightest because it fails to explain how non-state actors in the international system, such as intergovernmental organizations and nongovernmental organizations, affect the system. The primary anomaly that realism failed to predict was the demise of the Soviet Union – a change in power at the unit level which led to a change in the distribution at the system level.

This failure has led to a proliferation of theories that attempt to link behaviors within the state and behavior between states. It has also led to theories that attempt to define, explain, and predict the behaviors of non-state actors. The liberal institutionalist and constructivist schools of international politics, best exemplified by theorists such as Robert Keohane and Joseph Nye (Keohane and Nye 2001) for the liberal institutionalists, and Alexander Wendt (Wendt 1995) and John Ruggie (Ruggie 1998) for the constructivists, think that international organizations play a role in the way that a state's identity and interests are formed. They do this through the transmission of ideas, the negotiation of norms, and the provision of information and expertise.

Liberal institutionalists also assume anarchy, the primacy of the state as an actor at the international level, and believe the state's identity and interests are given. They believe that cheating between states jockeying for relative advantage leads them to create intergovernmental institutions to provide the information, repeated interaction, and so on that facilitates cooperation. For them civil society institutions are separate from, and support (or oppose) the state. Civil society, of which NGOs are a part, is *domestic* society in the liberal institutionalist view, and has a structural effect at the international level only through the state.

Constructivists, on the other hand, argue that the formation of identity and interests is not exclusively determined by the distribution of material capabilities (as realists say). They see state and civil society as being socially constituted by each other in an ongoing discourse, just as the state and the international structure are constituted. In particular, the assumption that constructivists make is that anarchy and power are mediated through and negotiated in a particular social context, while international interactions and practices affect state interest and identity formation, and therefore behavior.¹ Behavior in turn can affect the structure of the system, by changing both the functions of actors and the distribution of capabilities. International organizations are mechanisms for discourse and therefore for producing changes in identities as well as interests (and ultimately, for constructing a new *structure*). Until now, constructivism has had more use as a theory of the formation of state interests and identities (a theory of the unit-level), than as a theory of structure; however, the concept of global governance can be used to bring structure back to the argument.

A key aspect of the rise in global governance is the creation of global networks in which not all the actors are governments:

¹ For example, a material power like weaponry has to be understood in order to be used as a threat—if one's adversary does not know (or worse, does not care) what the consequences of a nuclear attack is likely to be, then threatening them with one is not going to be effective as a deterrent.

Global governance, which can be good or bad, refers to concrete cooperative problem-solving arrangements...It thus refers to the complex of formal and informal institutions, mechanisms, relationships, and processes between and among states, markets, citizens and organizations, both inter- and non-governmental, through which collective interests on the global plane are articulated, rights and obligations are established, and differences are mediated (Thakur and Weiss 2010).

Global governance as a concept thus emphasizes five components that are essential for analyzing contemporary international relations: the level of analysis, which is transnational; the issue area under question, such as environment or peace and security; the presence of actors other than states; the dynamics of governance itself; and the interdependent yet loosely-coupled complex system (rather than simple aggregation) of the whole. The latter three components are what make global governance a network concept.

Networks are complex systems (Jervis 1997, Flake 1998), a type of relationship between multiple actors. They are composed of actors who have agency: the ability to act and react. Depending on the framing of the issue area (peace and security, human rights, international trade, economic development, and environment are all examples of issue areas in world politics), network actors can include states, sub-state governmental units (such as a ministry or provincial government), IGOs, NGOs, TNCs, social movements, and individuals.²

Power relations in networks are just as likely as not to be asymmetric. Hierarchy is one possible "configuration" of policy networks, but so are clusters and hubs. Power in a network is thus defined as "the control over strategic rigidities in tight or loosely coupled systems, the conditions of entry/exit, inclusion/exclusion/expulsion, membership or other adherences, etc." (Marin and Mayntz 1991).

The state of network literature in American international relations field ranges from using network as a mere metaphor to explicit use of social network analysis techniques. Exemplifying this range of analysis are studies on vertical and horizontal governmental networks (Slaughter 2004), mapping a transnational network of activists in a particular context (Gordenker et al. 1995, Keck and Sikkink 1998), the qualitative effect of context on a network of actors (Price 1998), the implications of network topology on low-intensity conflicts (Arquilla and Ronfeldt 1996), and the network topology that had developed among global Salafi jihadists (Sageman 2004). Furthermore, there has been much variation in the application of SNA, from studies that use the occasional technique to those few (Knoke 1990) that wholeheartedly embrace SNA (Montgomery 2009). Generally, the studies have been either qualitative, or focusing on ties between people.

² This is in contrast to the definition in Marin and Mayntz: "Policy networks do not refer any longer to "networking" of individual personalities, to group collusions, to the interlocking of cliques, elites, party or class factions, as in older traditions, but to the *collective action of organized, corporate actors*, and consequently to *interorganizational relations in public policy making*."

Very little work has been done on relationships between multiple types of organizations, even less using quantitative methods.

For the purpose of policy making in the future (as well as for theory-building in the field of international relations) we need to have more accurate pictures of what actually happens. Slaughter's theory of vertical and horizontal governmental networks suggests that these networks, while nested in larger policy networks, will (and should, for reasons of accountability and legitimacy) lead the way in any response: they should decide what to do and why, and then they should be the ones to do it (Slaughter 2004). Is this what actually happened? Global governance suggests that other actors like think tanks will be equally important in deciding why, and NGOs like Doctors Without Borders/Médecins Sans Frontières (MSF) suggests that the "doing" part, implementation, is also heavily dependent on other actors. Furthermore, if network structures are indeed complex, it suggests that actors with similar attributes may play different roles according to the frame.

Human Security

The phenomenon under investigation, a disaster response network, is a crucial component in the provision of security. Security has more than one dimension. Traditionally, the question of "security for whom?" was answered "the state." And yet, this does not fully capture the concept of security. Starting in the late 1980s, security has been redefined to include other dimensions: not only may the threat come from outside or from within the community to be protected; but it may be natural or human—it may have agency (MacFarlane and Khong 2006). According to Paris, the basic questions to be answered are "security for whom?" and "what is the source of the security threat?" The answer to the first question may be either states or other collectivities and individuals. The answer to the second question may be either military or nonmilitary, or both (Paris 2001). At one diagonal of an imagined matrix there is human security, which is protection from environmental and economic threats to the survival of societies, groups, and individuals. At the other diagonal is traditional national security, which is the protection of the political community of the state from a military threat.

It should also be added that the speed at which a threat moves is also critical: it may strike with or without warning. Threats may therefore be imminent, as in a nuclear strike, or insidious, as in poverty. This is a situation that is exacerbated by globalization: the Black Plague took years to spread through and decimate Europe; SARS took only weeks to appear on the other side of the world. The source, object, and speed of the threat all help to determine what type of policy instrument is used to counter it, and especially in the case of transnational threats, may require that different institutions react in concert. A network responding to transnational threats to either human or national security requires connections and coordination—cooperation between actors.

Social Network Analysis Methodology

In order to model global networks, mathematical tools are necessary. Social Network Analysis (SNA) is the best method for exploring the social structures that result from global interactions because it makes possible the measurement of interactions, rather than of actor attributes. Network theory is an ontological question; network analysis is an epistemological stance. The social network analysis perspective includes the following aspects: actors and their ties are interdependent rather than independent, autonomous units; ties between actors are channels for the flow of information and resources; network ties both enable and constrain actions; and structure is viewed as enduring patterns of relations among actors (Wasserman and Faust 1994). The most important aspects of the social network paradigm are that it is concerned with structure, which is relational; it is based on empirical evidence; it is graph theoretical, which is visual; and it embodies a formal, statistical model.

SNA allows analysis of both the big picture, as well as local conditions. Techniques such as blockmodeling in particular can map the way different actors may play structurally similar roles in networks (White, et al. 1976, Luczkovich, et al. 2003). SNA also allows the tracking of multiple relationships between different types of actors and between different levels of analysis, without losing coherence. By making the interrelationships explicit and visible, lack of connection as well as duplication of effort can be seen with greater precision, thus allowing decision-makers to concentrate their efforts. A social network analysis may reveal properties of networks that are not visible through other methodologies, such as the cutpoint—a node that connects components of a graph -- the key actor that connects other actors. Knowing the structure (which both enables and constrains action) allows actors more freedom of agency: knowing *where* to influence is vitally important to being able to exercise influence at all. Furthermore, social network analysis methods allow the dynamic mapping of networks over time.

In order to use SNA, there must be evidence of specific interactions and relations among actors. In the following section, the two power relations measured in this study, institutional and compulsory, are explained.

Power Relations

Network terms can be translated into international relations via the measures of power in global governance described by Michael Barnett and Raymond Duvall. They divide types of power into a matrix with two core dimensions: the kinds of social relations through which power works, and the specificity of the social relations through which power's effects are produced (Barnett and Duvall 2005).

The first kind of power, familiar to realists, is compulsory power that represents direct control of one actor over another. This can be measured in network terms in many ways: as a regulatory relationship with one party making and enforcing rules, as a contractual relationship with an exchange of goods or services for payment, or a conflictual relationship with one party using violence against another. Institutional power is more diffuse because actors exert control over others that are socially distant. Membership in an alliance, attendance at UN conferences and other types of affiliations

are network relations that measure this type of power. Structural power represents the capacities of actors—in other words, what they are depends on where they are in the network. Finally, productive power is the production of subjects through the diffuse social relations of discursive practices. To paraphrase, an actor’s “self” is a creation of discourse, or negotiation with and against multiple others. This can be measured longitudinally by process tracing that links diffusion of norms and ideas to actor constitution—that is, it is helpful to track the progress of an idea through the network, and then look for evidence that the actors’ identities have changed as a result.

Networks could thus be demonstrated by treaties, executive agreements, and interorganization agreements, etc., to share resources and information. They could also be demonstrated by presence at decision-making meetings, and influential publications. The evidence of relationships can be quantified and directed. For example, in the case of contractors: the amount of the contract is interval data, and it flows from a source to a recipient (not the other way around). Such information is available in the ReliefWeb archives, and elsewhere in the UN, the World Bank, from country databases and situational reports, and in contemporary media reports. This paper maps two types of power relations, in hopes of discovering interesting information about the structural power relationship.

For this (admittedly coarse-grained) study, I will be using the following sources of network information: the spreadsheets compiled by the Financial Tracking Service (FTS), the global online humanitarian aid database; and the situation reports filed by the UN’s Office for the Coordination of Humanitarian Affairs (OCHA). The first is an instance of the compulsory power of financial contracts, while the second is an example of institutional power through the sharing of information. More information on the coding decisions is available in the appendix.

A. The Compulsory Power Relation

The Financial Tracking Service (FTS) is a global, real-time database which records all reported international humanitarian aid (including that for NGOs and the Red Cross/Red Crescent Movement, bilateral aid, in-kind aid, and private donations). FTS features a special focus on consolidated and flash appeals, because they cover the major humanitarian crises and because their funding requirements are well defined—which allows FTS to indicate to what extent populations in crisis receive humanitarian aid in proportion to needs. FTS is managed by OCHA. All FTS data are provided by donors or recipient organizations. Having control over material resources such as money and in-kind aid gives an organization influence over an organization that is requesting the use of the resources—in other words, it gives them a say in how the money is spent. For this purpose, it was also important to count only commitments and contributions, and not pledges.

B. The Institutional Power Relation

The OCHA situation reports record the activities of the OCHA staff, the UN system, and their interactions with states, IGOs, and other civil society actors. These interactions were recorded as undirected ties, because they did not have a beginning and end. They indicate the sharing of information and cooperation to coordinate activities that did not have the element of coercion—actors were free to do as they wished if they disagreed with the group. Furthermore, these ties were recorded as dichotomous, and not weighted in any way—either two actors cooperated, or they did not. It was assumed that if actors were recorded by OCHA in the same passage (usually a paragraph, but sometimes a table), then it was because they were working on the same project and were aware of each other's efforts.

The Indian Ocean Tsunami

On 26 December 2004, an earthquake that registered magnitude 9.0 (later adjusted to 9.3) on the Richter scale occurred just before 8 a.m. off the west coast of the Indonesian island of Sumatra. The epicenter was about 150 miles southeast of Banda Aceh. The earthquake occurred when the Indian plate was subducted under the Eurasian plate and was the second most powerful earthquake since 1900. The plates moved several hundred kilometers at a depth of about thirty kilometers. The vertical plate movement of about twenty meters displaced billions of tons of overlying ocean water. The resulting tsunami traveled at speeds up to 500 miles per hour. The tsunami hit Indonesia thirty minutes later and the coasts of Thailand, Sri Lanka, and India about thirty minutes after that.

While the knowledge necessary to predict tsunamis was available, the infrastructure and procedures to disseminate it were not. The US tsunami warning center in Hawaii issued a local warning about fifty minutes after the earthquake tremors had stopped, and there were no early official warnings to South Asia. Most people on the beaches or nearby were enjoying a peaceful day after Christmas and were completely surprised by the waves tens of meters tall.

The earthquake and the resulting tsunamis spread unprecedented devastation across the Indian Ocean, affecting thirteen countries, some as far away as Africa. The waves stripped the land of vegetation and tossed ships about. The destruction to buildings, roads, and infrastructure was disastrous, and the tsunami killed more people than any other in history—final estimates ranged up to 280,000—and displaced more than one million. Ten countries in South Asia (Indonesia, Sri Lanka, India, Bangladesh, Myanmar, Thailand, Malaysia, Maldives, the Seychelles, and Singapore) and three in east Africa (Somalia, Kenya, and Tanzania) suffered.

Viewers across the planet were transfixed by the images of waves swallowing islands and cities whole, creating scenes of apocalyptic destruction. On 26 and 27 December, the death toll was supposedly in the thousands because the scope of the impact was not immediately clear. As of 17 January 2005, the total death toll was estimated at 170,000. A year later, the total was revised upward to 225,000 (Geist, et al.

2006). Like Hiroshima after the first nuclear bomb was dropped, the devastation was so total that in many places there were no survivors left to report the damage.

Thousands of tourists, from the West and the region, were vacationing in the area with video cameras in tow. The video that they shot began to appear on international television news programs and on the Internet, allowing the scope of the disaster to become clear worldwide. In previous disasters of similar magnitude, such images would not have been available, as they would have been contingent on the technology of television and satellites, and the presence of camera crews in the area. In effect, these tourists became their own reporters, cutting out the middlemen of journalism.

The responses by a constellation of relief organizations, national governments, militaries, and private individuals around the world illustrate the strengths and weaknesses of global governance. An overall response network (states, IGOs, and NGOs) was in place, but the creation of the tailored network for the tsunami required negotiating a structure among existing groups as well as procedures to incorporate others that joined later.

The initial offers of aid from Western countries were small in comparison to the magnitude of the crisis. For example on 27 December, the United States initially pledged \$15 million to immediate disaster relief. Two days later this figure was increased to \$35 million, but it was already clear how inadequate this sum was. On 28 December, UN Under-Secretary-General for Humanitarian Affairs Jan Egeland made headlines by asserting that industrialized countries had been “stingy” (Regan 2004). (Egeland later clarified his remarks, explaining that most countries define giving in terms of percentage of GDP, in which the US lags, rather than total amount, in which the US leads.)

With this statement and acting as the world organization’s emergency relief coordinator, Egeland became the public face of the UN for the duration of the crisis. His comments were a bold start. By having the courage to say what others were thinking, he demonstrated clear moral leadership as well as constructivist framing; pushing countries into a certain kind of behavior through the power of an idea.

The Bush administration in particular took umbrage and was obliged to increase its pledge tenfold (to \$350 million) as well as explain that the US military had already created a joint task force in Okinawa, which included the *U.S.S. Abraham Lincoln* carrier group and six C-130 cargo transport planes (Waldman and Hoge 2004). The comment also started a bidding war within the West to see who could pledge the most aid. In an interview with BBC News and a speech on the House floor, US Congressman Jim Leach called it “competitive compassion.” He noted that what gave the phenomenon a new dimension was that this time it was not only competition between governments but also between intergovernmental and nongovernmental organizations (Leach 2005). For example, by the middle of January 2005, the European Union had spent \$30 million, had pledged \$132 million in short-term aid, and \$455 million for long-term reconstruction (BBC News 2005b). This was in addition to the amounts that individual governments had spent and pledged.

Considering the lack of warning system and preplanning, the Indian government reacted remarkably quickly. It sent immediate aid to Sri Lanka, as well as mobilized its navy to help in rescue efforts in Indonesia, Thailand, and the Andaman and Nicobar Islands, where it also began the task of remapping the ocean floor to allow rescue and transport shipping to reach the region. New Delhi also refused offers of aid for itself, part of a demonstration of their power and as bid for a seat on the UN Security Council under discussion in the lead-up to the UN's 60th anniversary in fall 2005. China also sent aid, with one expert stating that the actions of both governments were indicative of their worldviews: both "see themselves as civilizations, as great powers moving forward economically in ways that fit their sense of themselves" (Ford 2005). However, India's refusal to accept aid was also met with skepticism by NGO officials who in the past had experienced delays and duplication of effort in similar circumstances. Oxfam's humanitarian program manager in Delhi worried that the insistence on self-reliance made the international aid givers feel both unwelcome and wary about being able to account for what aid is accepted (Kremmer 2004).

The Indonesian and Sri Lankan governments, both of which were embroiled in armed conflicts with separatist movements, admitted freely that they were overwhelmed by the magnitude of the disaster. In Sri Lanka, where a ceasefire had been in effect with the separatist Tamil Tiger movement, authorities on both sides demonstrated a striking degree of cooperation in the initial relief phase: dealing with dead bodies, sheltering survivors, and providing food and water. In Indonesia, the separatist Free Aceh Movement declared a unilateral ceasefire, which was (temporarily) observed by the government as well. The Indonesian government also opened Aceh to foreigners, including the airport, which as one of the few undamaged points of entry in the region became a key staging area for aid distribution. Oddly enough, the situation in Sri Lanka then deteriorated, with the civil war continuing into 2009, while the tsunami crisis in Indonesia led to a lasting ceasefire and a re-integration of the rebel movement into the nation's body politic.

The offer of debt relief was refused by the government of Thailand (Ford 2005), which would only hurt their credit rating in the future in rebuilding the lucrative tourist industry. However, at an emergency summit convened in Jakarta by the UN on 6 January, the G-7 froze debt repayment. The summit also approved a UN call for a coastal warning system, similar to that already in place in the Pacific Ocean, to be implemented in the Indian Ocean (Reynolds 2005). (The system was partially operational by the first anniversary of the tsunami.)

Global and local civil society (Cardoso Commission 2004) responded with alacrity. Operational NGOs such as the International Federation of Red Cross/Red Crescent Societies (IFRC) along with national chapters, Oxfam, CARE, Médecins Sans Frontières, World Relief, World Vision, and Habitat for Humanity International were just some of the transnational groups that responded immediately, sending teams to assess needs and damage. In fact, the IFRC and World Vision were the largest single recipients and dispensers of humanitarian aid (Kamran 2007). The UN system—especially the

World Food Programme (WFP) and UNICEF—was particularly active and well-placed to assess immediate needs and to react and rely on previous partnerships with local NGOs. For example, in Tamil Nadu, in southern India, Oxfam relied on the Women’s Collective and the Association for Rural Women’s Education and Liberation (Kremmer 2004).

The corporate world responded as well. Some of the reported examples included Mattel, whose foundation gave \$250,000 to Save the Children. Citigroup allocated \$3 million to the Red Cross, local relief organizations, and long-term rebuilding. Microsoft sent \$220,000 to six Indian first-responder organizations; and by 4 January it had committed \$2 million in cash to local and international relief organizations while its employees had contributed \$700,000. Amazon.com became a fund-raising auxiliary for charities. Johnson & Johnson sent nine “disaster relief modules,” which are big containers filled with kits to care for wounds, pain relievers, sutures and personal care products through AmeriCares. Concern about accountability and transparency has led to increased monitoring of employer matching programs. Many other transnational companies, like IBM, responded through local offices and affiliates to calls from local officials within 24 hours for help from the companies’ crisis response teams to create command centers; by early January IBM had allocated \$1 million in cash and services to relief. According to one news media report, “Governments have been relying heavily on nongovernmental organizations and corporations to provide money, logistical help and expertise in the affected countries” (Stephenson and Strom 2005).

Individuals from around the world responded with overwhelming generosity. As the scale of the disaster grew, many transnational organizations reported that so many people were donating via the Internet that their servers could not handle the overload, over \$3 billion. Neither the tsunami nor the response network respected borders, as individuals joined states, IGOs and NGOs in aggregating and channeling funds to recipients in the region (Kamran 2007). It was possible to trace over \$2 million back to the New York area alone—likely the result of three factors: New Yorkers had the money, were likely to have personal ties to the region, and most live on islands (OCHA Table A 11 July 2006).

The agencies of the UN system did not remain idle either. For example, the WFP, the world’s largest supplier of emergency food aid, reacted within two days in Sri Lanka. However, their response in Aceh was hampered because the civil war had prevented pre-positioning aid in Indonesia (Blenford 2004). UNICEF was particularly active because children were especially affected because of their helplessness and vulnerability after losing parents.

On 29 December, the United States announced that it was forming a “core group” to coordinate aid delivery with the governments of Japan, Australia, and Indonesia. This announcement was met with widespread dismay, as it was feared that the main effect would be duplication of effort and chaos. NGOs in particular pleaded with Washington to let the UN remain in the lead and coordinated aid delivery (Oxfam 2004). Through the UN Office for the Coordination of Humanitarian Affairs (OCHA), the world organization had been coordinating the relief effort across the twelve most affected countries.

OCHA's "Situation Reports" were posted daily and gathered country-by-country data with such useful information as a situation summary, requirements, including a breakdown of provision by sector, agency, and dollar amount, the UN's response, and the national response. Through its ReliefWeb Internet site, OCHA was able to inform the world both what survivors' immediate needs were, what was being done to meet those needs, and the help aid workers required, such as transportation and communications equipment. For instance, when it became apparent that the infrastructure was too damaged to allow aid workers to reach victims, the United States was contacted to donate what were most needed, helicopters and pilots. And the same lack of infrastructure hampered communications, prompting Ericsson to donate satellite telephones. The United Nations had proved its mettle; several days after it was announced, the US "core group" was quietly disbanded.

Network Measurements

All calculations were performed with Ucinet 6 and all images were created using Netdraw (Borgatti, et al. 2002). The compulsory power network consisted of 2,107 records of financial transactions among 505 distinct actors. These actors were states, IGOs, NGOs, companies, academic institutions, municipalities, news media organizations, and private individuals, with a reserve category of "unspecified" for those that could not be traced via web search. The institutional power network consisted of 2,504 records of cooperative interactions among 234 distinct actors, in the following categories: state, IGO, NGO, academic institution, company, state-owned company, multiple (indicating an organization with multiple types of actors acting as one), and private individual.

Compulsory Power Network

Manipulation of the layout for this network initially used spring embedding, distances plus node repulsion, and started from a Gower metric scaling layout in order to exaggerate the clustering. This gives a graph that suggests interesting things about the nature of global cooperation. The length of the ties indicates the value; the shorter the length, the more money changed hands. The relationship between private individuals and NGOs is close and hierarchical; individuals are far more likely to aggregate their donations in NGOs. However, the picture is very different for cooperation between other actors.

[insert Figure 1 here]

The network created by the flows of resources could be separated into its principle components: donors of funds, aggregators of funds, and channels for funds into the region. This image plots the transnational aid flows by type of actor. The actors, which are colored according to *a priori* differences in organizational type (black for NGOs, dark blue for states, etc.) are grouped according to structural similarity. That is, those that received money from one set of actors and gave money to another set of actors

are thus approximately structurally equivalent: they performed similar functions in the network, even though they are different types of organizations.

The most interesting point gained from the analysis of the dataset (from the International Relations perspective) is found in the “structural equivalence” measure. Structural equivalence is the property of having the same ties to the same actors. There are five principle components in this network: 1. the private donors; 2. the IFRC; 3. World Vision; 4. a component with mostly NGOs, a few states and IGOs, and academic institutions; 5. a component with mostly states, and some IGOs and NGOs, companies, news and media organizations, municipalities, and unspecified institutions. Significantly, actor positions in the network did not depend on their attributes: different types of actors played similar roles, which is depicted in Figure 2.

[insert Figure 2 here]

These components demonstrate that different types of organizations are performing similar functions in international relations in at least the circumstances of human security. Actors in component #4 (the upper region of density on the dendrogram) seem to have been more of a destination for donor money as the organizations that spent in the region, while those in component #5 (the lower region of density) appear to have played a stronger role in aggregation.

These results seem to match the predictions that constructivists would make, especially in light of the vast imbalance in the values of the donations. In this case, then, the clustering suggests that most of the resources were in the hands of nonstate actors, bolstering the constructivist argument about their importance, and suggesting that blockmodeling may find positions that are structurally similar.

Density in a valued network is a measure indicating the total of all values divided by the number of ties possible in the network. When considering the entire range of monetary donations from OCHA’s Table A, it emerged that even with comparatively small amounts at stake, organizations played multiple roles, in many instances aggregating donations from both private actors *and from states* before passing them on, either to a transnational NGO or an IGO. The density of the entire network (dichotomized) was 0.9346.

Closeness centrality, or the shortest paths to all other actors cannot be measured, because the graph is disconnected (Wasserman and Faust 1994, 200). However, degree centrality, or the number of direct connections an actor has, can be measured. In a directed graph, the degree centrality of the actors can be given in in-degrees and out-degrees, indicating prestigious actors by the number of choices they received, or in-degrees (Wasserman and Faust 1994, 170). Since the data is also valued, the degrees consist of the sum of the values of their in-coming and out-going ties. However, degree centrality for valued data cannot be given as a normalized value for the purposes of comparison. For the compulsory relation network, the actors with the highest outdegrees are given in Table 1, and the actors with the highest indegrees are given in Table 2.

Table 1: Outdegree in the Compulsory Power Relation Network

Actor	Degree	Type of Actor
Private (individual donations)	41287.000	Private
United States of America	31309.000	State
United Kingdom	30713.000	State
European Commission	30307.000	State
Humanitarian Aid Office		

Table 2: Indegree in the Compulsory Power Relation Network

Actor	Degree	Type of Actor
International Federation of the Red Cross/Red Crescent	62388.000	IGO
International Organization for Migration	24894.000	IGO
Office for the Coordination of Humanitarian Affairs	20241.000	IGO
World Health Organization	18439.000	IGO

Private donations headed the list for outdegree. The list of highest indegree actors reflects the aggregating function that the IFRC plays internationally, similar to the way the American Red Cross aggregated private donations from people in the U.S (Kamran 2007). Indegree measures number of ties sent, not the strength of those ties – the monetary value of the IFRC’s indegrees was not as high as that for the American Red Cross.

That there is no co-incidence between actors with high indegrees and actors with high outdegrees suggests that the network was highly differentiated by function: some actors were receivers of funds, which were then funneled to others for spending. This is not what standard realist theory would predict. Furthermore, these functions were not a property of the type of actor. This result cannot be accounted for by either realism or liberal institutionalism. However, both can be accounted for by the constructivist school.

There are no cliques in a bipartite graph, as there are no nodes that are maximally connected, so other measures of finding cohesive subgroups had to be employed. The average distance between reachable pairs is 1.000, but the distance-based cohesion of the graph is 1.000, out of a range from 0 to 1 (larger values indicate greater cohesiveness). The transitivity of the network, indicating that every time there is a relation between i and j and between j and k , then there is also a relation between i and k (Wasserman and Faust 1994), is 90.86%.

These measures indicate that the network is cohesive. The measure of cohesiveness therefore likely means that the network was good at aggregating smaller sums, while the largest donations were spent without much coordination. This result has

implications for effectiveness at responding to a security event: networks that are not cohesive are less likely to communicate well, and should therefore be more likely to duplicate efforts and waste resources. That this actually happened has since been confirmed by evidence from post-action reviews (Telford, et al. 2006).

Institutional Relation Network

The disaster showed what the UN could do in terms of filling the institutional gaps. Because the world organization had standing operating agreements with almost all of the governments, civil society actors, and other organized groups, it was able not only to fill the gap in knowledge about what had happened and what was needed where, but it was also able to incorporate new actors when they came on the scene: thousands of individuals spontaneously created relief groups whose action needed to be directed usefully (Global Surf News 2005). In the network of institutional power relations, the UN is a cutpoint, while no member of the “core group” was, as demonstrated by Figure 3.

[insert Figure 3 here]

The cutpoints are the UN, the World Health Organization (WHO), Maldives, Thailand, Sri Lanka, and Indonesia. It is likely that Washington’s proposed “core group” would have resulted in a very different network. The most central actors, for example, would have been the bilateral aid agencies of states rather than private donors, transnational NGOs, and transnational IGOs. And it is likely that the network would have had a different hierarchical structure, with the bilateral aid agencies at the center and all others on the periphery.

The average density of the network is 1.0056, with a standard deviation of 0.0748. This is difficult to interpret—as this is not a valued graph, I am not sure why I am getting this number. The graph is not completely connected, so the density measure should not even be one, let alone over one.

The measures of both degree and closeness centrality of the top ten actors in the network appear in Tables 3 and 4:

Table 3: Degree Centrality in the Institutional Power Relation Network

Name	Degree Centrality	Type of Actor
UN	93.562	IGO
Indonesia	55.365	State
Sri Lanka	52.490	State
Thailand	36.052	State
US	35.193	State
World Bank	34.335	IGO
Asian Development Bank	33.906	IGO
Australia (tie)		State

India	33.047	State
Japan (tie)		State
IFRC	32.189	NGO
Maldives	29.614	State

Table 4: Closeness Centrality in the Institutional Power Relation Network

Name	Closeness Centrality	Type of Actor
UN	93.952	IGO
Indonesia	69.139	State
Sri Lanka	67.930	State
Thailand	60.995	State
US	60.677	State
Australia	60.207	State
World Bank (tie)		IGO
Asian Development Bank	60.052	IGO
India	59.897	State
Japan	59.744	State
Maldives	58.690	State

There is a mix of actors for both measures of centrality, although the cast does undergo some changes in membership. In both cases, the countries most greatly affected by the tsunami are present, as well as the UN, the US, Australia, Japan, and the financial branch of the international community (as represented by the World Bank and the Asian Development Bank) are present. For degree centrality, it is interesting to note the key role of a transnational nongovernmental organization, the International Federation of the Red Cross/Red Crescent (IFRC) in coordinating humanitarian aid activities. However, for closeness centrality, the IFRC does not make it into the top ten. These measures indicate both the importance of the US idea of a core group, as these countries' services were essential to the response; as well as why the idea was dismissed—they were essential, but not the most central to the response.

The network's measure of transitivity is 100.00%, indicating that cooperation was very close, even more cohesive than in the compulsory power network.

Comparison to The Past: The Krakatau Eruption of 1883

The provision of emergency supplies to affected populations was available almost immediately, reflecting a long-standing global moral commitment to react quickly and generously in the face of natural disasters. As people in the affected regions began calling, texting, and uploading images and movies, massive relief began. In a natural disaster, the acceptance of outside humanitarian action was virtually automatic, which is not the case in wars because aid can be seen to be benefiting the enemy rather than the common good. Humanitarianism can be traced from the major world religions through

Cicero, medieval philosopher St. Thomas Aquinas, father of international law Hugo Grotius, and liberal peace philosopher Immanuel Kant.

As a codified modern international institutionalized response, humanitarianism can be traced back to the Battle of Solferino (1859), when Henri Dunant's actions led to the formation of the International Committee of the Red Cross, to his lobbying for Napoleon III to proclaim the rights of the wounded, and to the 1864 Geneva Convention. This modern commitment generally spread outward from its European origins, slowly encompassing disasters befalling non-European peoples. Norm evolution since then has both sought to constrain state actions and enable international succor for natural and many human-made disasters (Weiss and Collins 2000). In the case of the tsunami, we have seen that "competitive compassion" resulted in what many even saw as excess resources for the tsunami victims.

When the volcanic island in the Sunda Strait between Java and Sumatra exploded on August 27, 1883, the world's response was markedly different. In the words of an eyewitness to the lava storms and the waves:

It was while we were thus enveloped in darkness that the stones and cinders discharged by the mountain began to fall upon the ship. In a short time the canvas awning and the deck were covered with ashes and stones, to the depth of two feet, and all our available men were employed in removing the falling mass, which would otherwise have sunk the ship...While we were engaged in this struggle, and enveloped in the sheer blackness of a veritable hell, a new and terrible danger came upon us. This was the approach of the tidal wave caused by the final eruption, which occurred about 12.30 to 1 p.m. The wave reached us at 2 p.m. or thereabouts, and made the ship tumble like a sea-saw...When we reached Angier we found no trace – not a splinter of wood nor a fraction of stone -- of the buildings of that once flourishing seaport. (Worsfold 1893).

The tsunamis that resulted from Krakatoa's eruption killed more than 36,000 people (Winchester 2003).

However, Indonesia at that time was a possession of the Dutch government. Having endured colonization by both the Dutch and British East India trading companies as well as changes in sovereignty dependent on the changes in fortunes of various European empires, the people of the area were in a state of rebellion. In particular, the "culture system" required villages in the Dutch East Indies to set aside 20% of their crops for taxes which provided fabulous profits for the Dutch but no public improvements or services of any kind for the villagers (Worsfold 1893, Winchester 2003). This system did not end until 1871.

The current round of globalization, spurred by innovations such as the railroad and the telegraph spread the details of the disaster to the world. But the global response was more to the spectacular sunsets caused by the pollutants in the atmosphere than to the

human suffering (Altick 1960). According to Winchester's account, the primary response of the other naval superpower of the day was to ensure that the international shipping lanes remained open (Winchester 2003). Such perceived callous disregard on the part of others fueled an already-angry brand of Islamic fundamentalism in Indonesia, especially the popularity of religious leaders such as the Sufi mystic Hajji Abdul Karim, who preached of the imminent arrival of the Mahdi. The Dutch, despite their large relief operations, were in uneasy control in Java and Sumatra. Winchester writes that the eruption of Krakatoa may thus have sparked the Banten Peasants' Revolt in 1888, a prominent milestone on the way to Indonesian independence.

In contrast to the past, while criticism was leveled at poor management of relief funds (accompanied by fears that long-term support would dwindle), the basic goal of averting a second crisis was achieved. In particular, the UN and others moved to address the democratic deficits of disaster recovery by appointing an independent auditor. In February 2005 the auditor's task was taken on by the Tsunami Evaluation Coalition (TEC), a non-profit multi-agency learning and accountability initiative from across the humanitarian sector, including the UN system, donor nations, and transnational NGOs. The stated task was to ensure that the more than \$6.7 billion that was pledged for humanitarian aid (Stamp 2005) actually reached the intended recipients. Corruption and leakage were often problems in such previous disasters as Hurricane Mitch in Central America or the earthquake in Bam, Iran (BBC News 2005). As of January 2007, TEC found that the funding was unusually transparent, generous, speedy, and from non-government sources (Telford, et al. 2006). However, much of the aid and accountability available for this unusual blockbuster natural disaster are absent in less visible emergencies of all types.

Conclusion

This project makes clearer the existing relationships between actors, thus suggesting areas in which improvements can be made. It also shows that the structure of the network makes a difference in how effective it is in meeting the threat it was created to resolve. The pattern of cooperation that emerged in this investigation indicates that this is an important area for study in the field of international relations. By using the techniques of social network analysis, it is possible not only to verify the hypothesis that nonstate actors are important in world politics, but also to quantify much more precisely just how important they are. This ability is an important step in fleshing out a theory of international relations that is capable of dealing with more than one type of actor.

The findings and analysis of the compulsory relation confirm the hypothesis that nonstate actors can be as or more important than states in the right context. The actors with the largest indegrees and outdegrees (number of donations) were more likely to be nonstate actors such as NGOs and IGOs than states. Analysis of the components showed that actors with different attributes played similar structural roles in the network, demonstrating that international politics is even more complex than most realize: it is not possible to tell an organization's position from attributes such as sovereignty or source of funding alone. Context is more important than the leading mainstream international

relations theories allow: framing the issue as one of human security allows the participation of a greater range of actors in more varied roles. Even more importantly, organizations of different types played structurally equivalent roles in the same network, meaning that the actor's attributes do not predict its role, even given a particular context.

The findings and analysis for the institutional power relation look more like what one would expect from the predictions of liberal institutionalism than of constructivism. An IGO, the UN, was the most central actor, and states were vital to the coordination process. NGOs both local and transnational played a more peripheral role in this network than in the compulsory power relation. This bears out the liberal institutionalist hypothesis that IGOs play a major role in international relations precisely because of their ability to marshal expertise is institutionalized (Goldstein and Keohane 1993).

The two networks are not exactly comparable; the former is valued and directed, while the latter is neither. However, comparison in relative terms is still useful, and shows us that while nonstate actors were important in both networks, they were more important for funding than for coordination. In human security then, different types of actors are likely to occupy different positions of structural power.

For Further Research

The response to the Indian Ocean tsunami of December 2004 was anomalous—unlike most appeals for humanitarian aid from the U.N., it was over-funded. A nice side effect for social scientists of the globalization about which we theorize is the amount of data that is now available to us for empirical study. Future research using SNA on the tsunami response should look at several things, such as extending the analysis to the “destination” category to further map the money trail; adding a relation for information-sharing in order to include organizations that gave manpower and expertise rather than goods or money; and adding the element of time in order to see and compare the dynamics of this network to others.

In particular, the records of donations for those other appeals should also be subjected to similar analyses: the networks should be mapped and differences noted. For example, does it make a difference for the network structure if the human security situational framework is the result of a natural disaster, a conflict, or a complex emergency? Complex emergencies are characterized by extensive violence and loss of life; massive displacements of people; widespread damage to societies and economies; the need for large-scale, multi-faceted humanitarian assistance; the hindrance or prevention of humanitarian assistance by political and military constraints; and significant security risks for humanitarian relief workers in some areas (OCHA 1999). The psalm quoted at the beginning of this paper clearly differentiates between acts of God and acts of man—does humanitarianism also make the distinction? In other words, what is the role of human agency in the context in which the response is embedded? These networks should also be mapped against networks from the more traditional side of security, such as military alliances.

It would also be interesting to compare transnational networks with national and local disaster response networks. The findings here, which emphasize the role of the UN, states, and large transnational charities, disagree with those from a study of the network of responders in the World Trade Center disaster, which found that emergent coordination was more likely (Petrescu-Prahova and Butts 2005). Are there economies of scale when responding to disasters? It would of interest to generate time series data from the raw data, allowing the study of network dynamics. For example, do these security networks exhibit phase transitions or explosive percolation (Achlioptas, et al. 2009) in their growth?

Since obtaining complete data is unlikely in the social sciences, the total response networks should also be estimated using Bayes's Theorem. With more complete information, additional methods such as game theory could be useful in developing predictive theory, such as determining an actor's options and probable course of behavior, given a particular network structure.

Finally, there is a real need to expand the ability to manipulate multimode data. For this analysis, having additional modes available would allow the extension of the analysis to consider the source of the private individual donations and the destinations of the funds within the affected region. It is quite likely that social scientists investigating other phenomena such as complex emergencies will also encounter multiple modes of data: wars and their combatants and suppliers, disasters and their internally displaced people and refugees, states, NGOs, IGOs, and so on. Measures of multimode network data should be developed and incorporated into network analysis software.

Social network analysis also allows us to capture an Olympian view of global relationships in a comprehensive way. Global governance can be imagined as a cloud of actors interacting—or not—on every conceivable global issue. In depicting the entire network, it is like taking a slice through the cloud, like an MRI takes a picture of a slice of the human body. These slices can then be compared, or put in sequence. Comparing other security networks using the same power relations should give much more insight into their functioning.

The first step in building a network theory of international relations is to embrace the idea that other actors, beyond the state, are more prevalent in world politics than realist and liberal institutionalist theories have previously suggested. Therefore, it is imperative that scholars and others be very clear about who makes decisions, on what authority, and in what relation to each other. Network structure will affect relations; we need more information on how it will do so.

Appendix: Coding Decisions

The Compulsory Power Relation

The raw data for the compulsory power relation is OCHA's "Table A: List of all humanitarian pledges, commitments & contributions in 2005," compilation as of 11 July

2006, showing donors, channels through which aid flowed, final destination of aid, description of project, and value in dollars. Humanitarian aid is defined as “an intervention to help people who are victims of a natural disaster or conflict meet their basic needs and rights.”³ Because FTS is mandated to track all humanitarian aid, it was necessary for FTS’ stakeholders to develop a definition of humanitarian aid for statistical purposes, which serves as the criterion for posting funding information on FTS.

Again, it is important to note that these data were compiled by OCHA through organization self-reporting; while the information in OCHA Table A can be considered complete for the purposes of analyzing global networks of aid flows, using formal analysis techniques, there is no way to completely capture all of the humanitarian aid that was given in response to the tsunami, much of which was given by individuals in the region and never recorded.⁴ Furthermore, some recorders chose not to follow the database's standards. China in particular failed to record a monetary value for many of its contributions, thus resulting in an undercount.

Changes had to be made to OCHA Table A: the uncommitted pledges column was deleted; as were in-kind donations without dollar values; all description information except destination was deleted (if destination was not given, the entry was added to the "Region" category); an "allocation of unearmarked funds" from an organization was listed as simply coming from that organization, and "bilateral" channels were listed as state-to-state.

Two columns of attribute data were added to OCHA Table A: Type of Donor and Type of Channel, created with information from ReliefWeb. These columns listed the organization type as an attribute: international organization (IGO), nongovernmental organization (NGO), etc. The following attribute coding decisions were made: the International Federation of Red Cross/Red Crescent Societies (IFRC) is listed as an "IGO" because ReliefWeb categorizes it as "UN & international organizations", and all EU agencies are listed as "state" for the same reason. Channels that were listed as multiple countries or vague descriptors such as "UN Agencies, NGOs and Red Cross" and any acronyms not found in ReliefWeb or through Google were coded as "Region" for having been spent there; and their organization type was coded as “unspecified.” Other organization types were NGO, state, and company. Finally, in order to create digraphs that showed large flows of resource (and were understandable), all records from private individuals were simply aggregated and coded as “private,” as the goal of this study is to map transactions that crossed international borders. What is of interest here is the attribute character of the donors, not their individual identity.

³ FTS Definitions-Glossary at <http://ocha.unog.ch/fts/index.aspx>. More information on the criteria for inclusion as “humanitarian” aid versus other kinds of aid is available at http://ocha.unog.ch/fts/exception-docs/AboutFTS/FTS_criteria_for_posting_contributions.pdf.

⁴ Furthermore, there is a notable lack of documentation for U.S. expenditures, such as the mobilization of the Lincoln carrier group out of Okinawa. While the carrier group would have operated anyway, its helicopter pilots would not have flown thousands of sorties, and that cost appears to be underrepresented in this data set.

Again, the raw data were three-mode, with donor individuals and organizations listed separately from the organizations that served as aid channels and from the ultimate destination of the aid. In order to make sense of the aid flow, donors, channels, and destinations were recoded into two modes: sender or receiver of aid, in essence deleting the destination column, to create a dyadic two-mode network, but without double-counting the channels. This is unfortunate, because both the lost information and a visual representation of the destination data would have been useful theoretically. This network was then transformed into a directed bipartite graph using iterative metric multidimensional scaling based on similarities.

The Institutional Power Relation

Information for this relation was taken from the thirty-eight OCHA Situation Reports written between 26 December 2004 and 29 April 2005. Coding decisions were based on mining paragraphs for relationships. For example, see this passage from Situation Report 25, dated 8 Feb 2005:

Planning and/or construction of temporary and semi-permanent schools is underway. The identification of suitable sites for semi-permanent school shelters is causing problems in densely populated areas, such as Ampara. Proposals for temporary school buildings in Paddiruppu and Batticaloa education zones (Batticaloa district) have been approved and work will start immediately. A proposal from Kalkudah for construction of semi-permanent buildings is being considered. In Jaffna district, UNICEF has agreed to undertake the reconstruction of 2 schools; GTZ will be responsible for 6 schools and the Swiss Development Cooperation (SDC) will be responsible for 4 schools. UNICEF will support the construction of 46 temporary modular classrooms in Maruthankerny in Jaffna district. These will accommodate up to 1,500 children.

In this passage about school construction, the Sri Lankan authorities, UNICEF, GTZ, and the Swiss Development Corporation have all worked together to provide school buildings while not duplicating each other's work.

Intra-state cooperation between the various ministries and agencies was not recorded. If a passage mentioned cooperation between the ministries and agencies of a state with another actor, it was recorded as a relationship between the state and that actor. The reasoning is that the purpose of this study is to examine transnational cooperation, not domestic institutional cooperation. Any meetings that were mentioned in the situation reports were also recorded as relationships. For example, this includes the regional workshop on rehabilitation of fisheries and aquaculture in coastal communities of tsunami affected countries in Asia, held from 28 February to 1 March 2005, in Bangkok, Thailand. These meetings account for several large "clusters" in the network of well-connected actors. However, it should be noted that many meetings were not mentioned in these situation reports, and that of the meetings mentioned, lists of

participants were not always available. Also, several times the working partners were not named individually.

Finally, a word or two about the UN system is in order: the various UN agencies, including OCHA, were recorded simply as UN. This may have made the UN seem more central than it already was, given the authorship of the situation reports. However, the purpose of this study is to trace transnational cooperative interactions, not intra-organizational cooperation within the UN system. The exceptions to this rule were the autonomous agencies affiliated with the UN: the World Bank group, the UN Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO), the International Labor Organization (ILO), and the Food and Agriculture Organization (FAO). These agencies have become part of the UN system, but most have separate origins, and may have staff and budgets that are not within the UN.

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Figure 1: Compulsory Power Relation Network

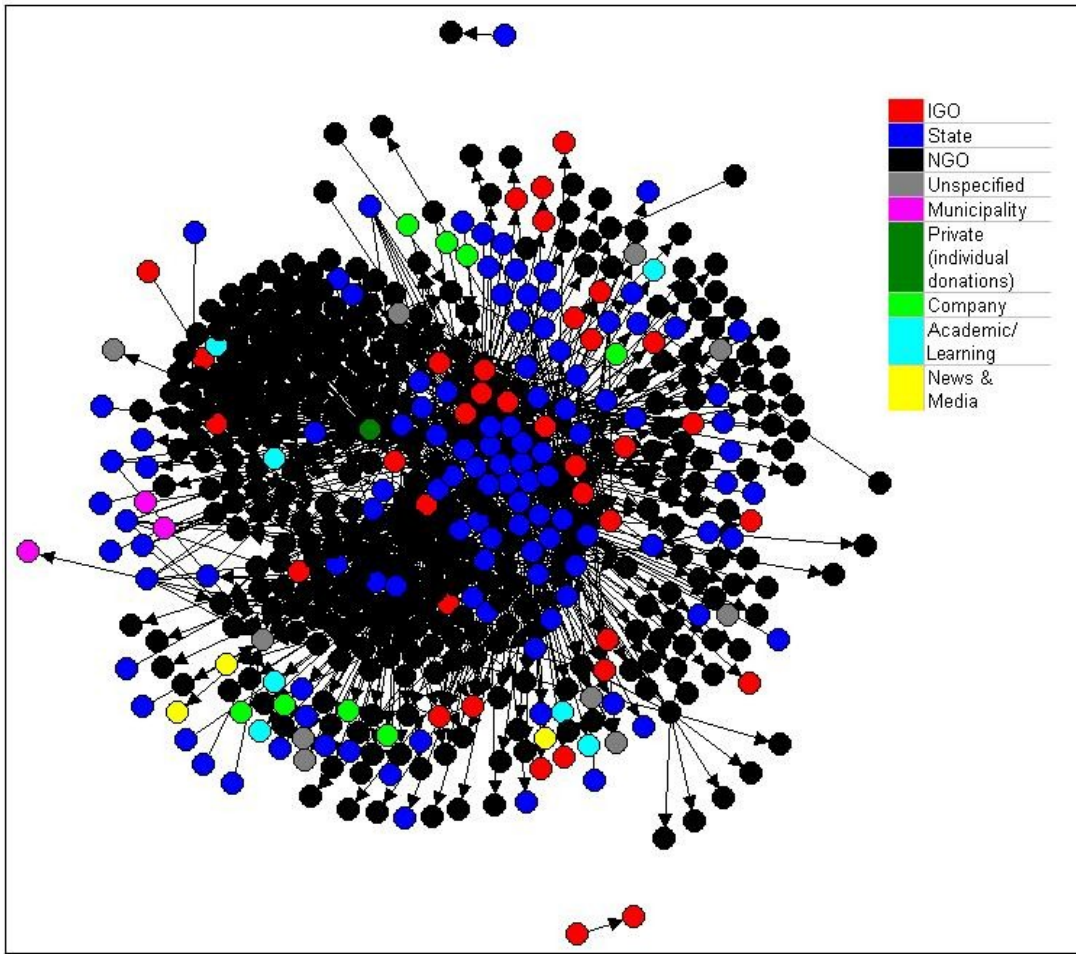


Figure 2: Dendrogram of principle components

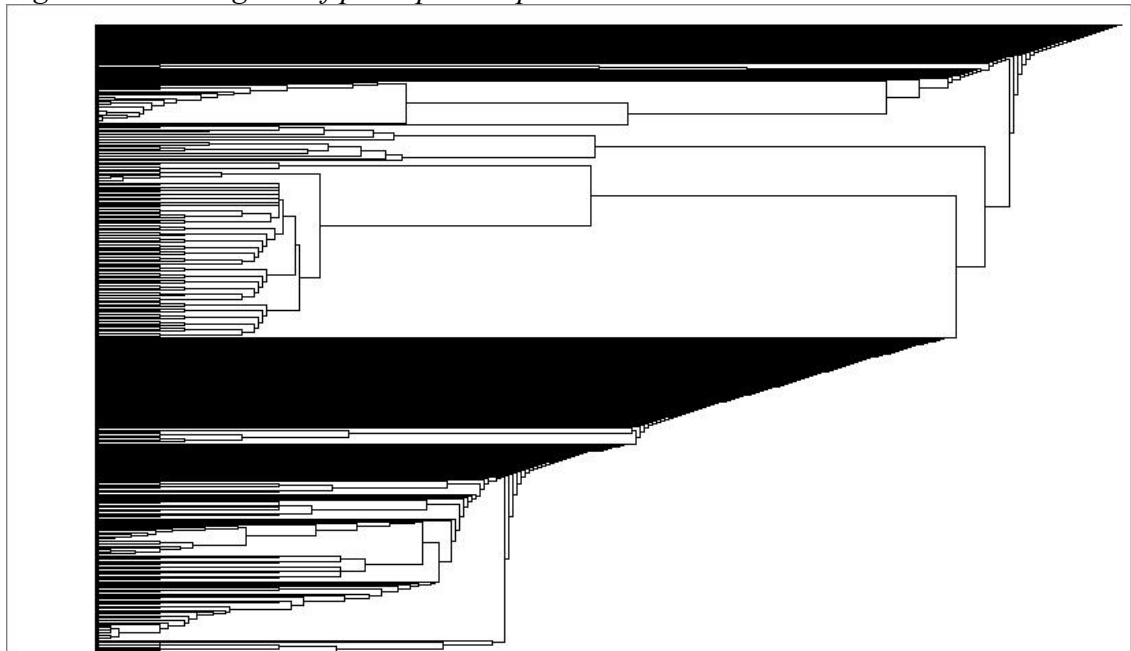


Figure 3: Cutpoints in the Institutional Power Relation Network

