Florida Manatee Conservation

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Julianna Chaput
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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Signature  Date 4/27/2020_
Julianna Chaput

Approved _____ Date _____
Michael Gorman, Department of Engineering and Society

Introduction:

The first manatee was discovered in 1741 (Mantees and How They Live, 2019), 75 years before the first proposed propeller design achieved its patent (The Inventors of Propellers, 2019). As with many areas on Earth, the bodies of water in the Central Florida area have been homes to millions of different marine species for long before the humans inhabited it. One of the most affected animals in this region is the manatee. Manatees are naturally slow-moving mammals that tend to graze just under the water level. This leaves them at great risk to be involved in boat collisions and being lacerated by motor propellers. Due to this, on an average, about 130 manatees are killed each year and of the remaining, 85 percent have a distinguishable laceration scar (Mantees and How They Live, 2019). This is over seven times the number that the FWC estimate of deaths that will affect the existence of the species (Florida Manatee, 2019). As a result, all species of manatees are considered endangered species and they are protected under the federal laws of the Endangered Species Act and the Marine Mammal Protection Act, as well as the Florida Manatee Sanctuary Act (Manatee Conservation, 2019). The Florida Fish and Wildlife Conservation Commission (FWC) has main authority in creating the protection laws for this species but many other research and conservation groups in this community.

Although much of the endangerment is due to direct human contact, the effects of climate change have brough much danger to the species as well. Florida since the turn of the century has been experiencing higher-sea levels and natural storms of increased severity (Ruppert & Deady). This heightens erosion, decreasing the shallow watered habitats where manatees reside. The high winds that accompany hurricanes also add to the destruction of the manatee habitat. In attempt to deal with these effects, Florida state and local governments have gotten involved, making it a state-wide concern among all residents.

Due to the interest in protection of this Florida native species, there is high potential for the use of an Actor Network Theory. The main missing piece from having a successful network is the lack of enrollment from actors from the boating community. If the conservationists, scientists, engineers, and manatees could all form a network, then an environment could be created that is safe for the manatees and pleasing for the boating community.

Actor Network Theory and Manatee Conservation Research:

The Actor Network Theory (ANT), starting in the late 1980s, is a sociological approach to the way that groups from different scientific fields and nature connect around a specific topic, creating a "network". Each of these groups or species are designated an actor and are given equal responsibility to the success of the network. The main goal of this theory is to eliminate the

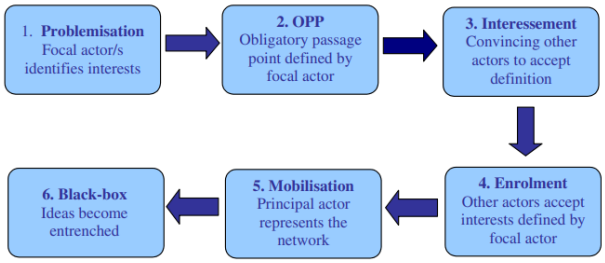

Figure 1: The Phases of Translation *(Rodger, Moore, & Newsome, 2009)*

precedented facts and assumptions about the subject but follow how the actors work together and make fact off of their observations. Further explaining, with this method the distinction between things such as law creators and law enforcers are disregarded. Rather the theory focuses on the way they utilize and complement each other. With this method of thought, there is no discussion on which role is more important or responsible but creates a connection that requires equal effort. This process of the actors connecting and creating is known as "Translation" (Rodger, Moore, & Newsome, 2009). The steps of Translation can be seen in Figure 1. From this, a network can be built.

For most networks, they are able to get established, but struggle to maintain the full enrollment of all the actors (Rodger, Moore, & Newsome, 2009). As soon as one actor falls out the network is incomplete and must adapt to survive. If an actor is unable to continue fulfilling the designated responsibilities, then they no longer qualify as active. When this is the case, the network can change, finding a new actor that is able to fit the evolving role. This is very manageable, but more times than not, the role is unable to be filled and the network dissolves. The fragility of the network is one toughest parts of the Actor Network Theory method. Even with all the constant involvement it requires, the benefits can have a major effect on the manatee community. Building a network centered around manatee conservation will bring constant attention to the risks faced by manatees and damage to their habitats. With a network the risks can be analyzed, discovering solutions that can be implemented via policies, teaching, and awareness.

As stated, a main pillar of the ANT is that all actors must have equal commitment, but not always equal responsibility. Without equal commitment it creates weaknesses in the network and leaves the network vulnerable to failure. Looking at past successful wildlife actor networks, one of the most, if not the most crucial member is the actor that connects all of the others together. For the Wildlife Tourism Network in Australia it was the scientific colleagues that conducted their research. This community of scientists were not only responsible for conducting the research and tracking the penguin actors, but they had a major influence on the network's alliance with the Australian National Antarctic Research Expeditions (ANARE) Strategic Plans and the Antarctic Science Advisory Committee (ASAC). The supporting scientific colleagues and broader community from the beginning had less commitment than the other actors. This specific Australian wildlife wasn't their only area of study so once they changed focus, they

became uninvolved. Without the scientist's support and knowledge, the ASAC lost power in which direction further research went. This led to the priority of wildlife-tourism research diminishing in the ANARE Strategic Plans and the loss of the alliance between the ANARE and the ASAC. This ultimately resulted in the breaking of the network. It lost its influence to change regulations and have an effect on the community (Rodger, Moore, & Newsome, 2009).

For the possible network for the manatees, this major influencer would be the Florida Fish and Wildlife Conversation Commission (FWC). Summarized by their mission, the FWC's purpose is the "Managing fish and wildlife resources for their long-term well-being and the benefit of people". They are main connection between wildlife and humans for the whole state of Florida. The FWC manages and protects over 1275 species of animals between land and water wildlife (FWC Overview , 2019). They play a major role in how humans interact with Florida wildlife, making sure that people can continue to participate in hunting, fishing, and boating without putting these species at risk. This includes strategic planning and implementing laws and regulations, such as licenses, hunting season dates, and boating speed zones. Specifically effecting manatees, the FWC provides the "Boater's Guide to Living with Florida Manatees", "Protecting Native Wildlife – Manatees", and "Waterway signs" handbooks (Information for Boaters and PWC Operators, 2019). These contain the rules that are enforced by the Coast Guard and the Florida's Sherriff Police Department. The FWC is also responsible for research and tracking of their species. They have multiple conservation groups that focus on each species or group of similar species to follow their population numbers, leading causes of deaths etc. For manatees alone, they have three different organizations (Manatee Research, 2019). Since the FWC's influence is so widespread, they would qualify as a base actor for the network to be built off of. With the help of the FWC, alliances could be built between scientific researchers, policy

makers, law officials, and manatees themselves. Throughout the FWC will remain the core of the network, enabling its success.

The next connection that would be made is to the scientific researchers and organizations that will follow the manatees. The manatee is the only non-human actor and the most crucial member of the network. Because of that, one of the actors must include a group of specie researchers. The specie researchers would be necessary to track and observe the same group of manatees. In order for the manatees to be a qualifying actor, it must be the same ones, so that research is consistent. One current possible actor is the MOTE Manatee Research Program (MRP) out of Sarasota, Florida. It is one of the three mentioned organizations under the FWC that studies manatee behavior, population, and distribution throughout the state of Florida (Manatee Research, 2019). The MOTE MRP collaborates with the University of Florida, expanding their area of observation to southern Florida and the Caribbean (University of Florida, 2020). Aside from the larger observational area, this connection with the university spreads the network to the younger generation. Through student researchers and interns, the awareness is shared, helping to prevent the problem for the future. The MOTE MRP qualifies as an active actor since the research is ongoing and relevant to Manatee conservation network.

Another influential actor to the network would be the people who are majorly responsible for enforcing the rules on the water, the Coast Guard. This branch of the military has a diverse array of responsibilities that cover anything that may take place on the country's waters. The Coast Guard is throughout the country but are heavily present off the coasts of Florida due to the vast amount of waterway and close vicinity to foreign countries. Due to this, the Coast Guard, along with local police departments, are the main enforcers of the marine laws and regulations. They have two different divisions that support this effort, Ports & Waterway Security and

Marine Environmental Protection. Ensuring that the recreational boaters are following the waterway laws, such as controlling speed in Manatee Zones, falls under their Waterway Security. Maintaining the marine ecosystem and the human-wildlife interaction is part of the Coast Guard's Marine Environmental Protection mission (USCG: A Multi-Mission Force, 2019). Having the Coast Guard as part of the network will increase their knowledge of the dangers that manatees face and add importance to their job of protecting them. This will give the network its best chance of being successful and effective.

The researching actor is responsible for providing the data that supports laws and the enforcing actor implements the laws, so an obvious necessary actor would be the people who created and pass these laws. In 1953, under the Submerged Lands Act, *state waters*, were created. State waters are the region of water from zero miles off the coast, referred to as the baseline, to three nautical miles out. While this is federal law and stands for the East Coast of Florida, due to historical precedents, state waters extend out to nine nautical miles for the West Coast of Florida. Manatees are coastal shallow water creatures that reside in this state water region (Ocean Commission, 2019). This means that the Florida State legislature is responsible for developing the laws to protect the species and their habitat. There are additional laws that protect marine life from the federal level. In October 21, 1972 the Marine Mammal Protection Act was passed which made it illegal to harass, harm, hunt, or kill any marine mammal (U.S. Fish and Wildlife Services, 2020).Under this, if any intentional harm is brought to a manatee it is a federal offense with punishment of $50,000 fine, one-year imprisonment, or both (Florida Fish and Wildlife Conservation Commission, 2020). These bills and policies regarding manatee safety are created primarily at the federal and state level, while local governments are left responsible for direct action. Since the administration of Governor Rick Scott, task forces and committees

were created to be the first line of contact in cases relating to Florida marine life. These cases include data collection, habitat monitoring and response to accidents (Ruppert & Deady). Since the federal, state and local legislatures all combine in the responsibilities of marine life protection each level would qualify as an actor. With this, policy makers and influencers are in direct contact with the necessary data to create more impactful and accurate laws and regulations. Currently, the only limitation with the legislative actor is priority of the subject. With past environmental legislature, most regulations were passed with little conflict over than its importance over other societal issues. Once the research is looked at and time is given to the issue it will pass with support, the struggle is getting it to this stage. In current time, America can be a divided and controversial country, playing tug of war on where policymaker's efforts should be focused. Due to Mother Nature's ability to be perceived as not time sensitive, environmental issues are often put to the back burner. By incorporating all levels of policymakers into the actor network, then the importance and priority of the problem can be heightened.

There are multiple challenges facing the creation and effectiveness of this network. The first one is commitment. As mentioned with the Australian network case, without full commitment from all actors, the chance for success diminishes. Another major challenge the network with have to overcome is publicity. Today's world is full of debating and distracting politics. The network will have to create a way for this Manatee issue to gain light and popularity. That might be with the use of social media, celebrity support, or awareness rallies, anything that can gain attention. Once the issue is known to the public, it increases the chances of political attention and action. The network will also face the challenge of getting the boating community's full commitment. This is an important component; due to the amount of direct contact they have with the manatees. Unfortunately, due to the nature of humankind, people can

be stubborn and resistant to change. Polices may be passed and the police may be doing their best to enforce it, but without people making the commitment to boat manatee-friendly, chances of success will be low. To tackle this challenge the network needs to appeal to the boaters, explain what's in it for them. Get a big-name from the boating community to be a spokesperson, use commercials to highlight on the advantages of using the new manatee-safe propeller. In all challenges the network will need the expertise of outside sources to beat it. It'll be this that will allow this network to make a change.

The goal of this proposed network is to conserve the Florida manatee species by creating trading zones between the manatees and their main direct predator, the boat propeller. For this to be effective, the last actor in the network must be from the marine engineering division. Having a member from the group that designs and produces these propellers allows a trading zone to be created. From this the engineers can communicate easily with the conservation researchers, working towards a product that satisfies both customers, the boaters and manatees.

Trading Zones in the Network:

Trading Zones are described as "hubs" of communication between groups of different background knowledge, where a common language and understanding is developed. Initially, these "hubs" were constricted by location, creating a common language between people who were physically near each other. With the brink of the 21st century and its accompanying technology, these "hubs" were now able to be much larger and diverse. They are now able to connect people across the world, advancing the trading zones and improving their influence. These can be useful for efficiency when working with a wide variety of specialist towards a common goal. Using a common language eliminates the risk of miscommunication and ensures efficient and successful results (Gorman & Werhane, 2010). These are common in the science

and technology fields. Although many inventors may be known alone for their creations, no one can make an invention completely by themselves. There is always research of previous work done by earlier inventors and the studying of discovered theories or scientific laws from other fields that leads to a new invention. This is how trading zones are utilized to integrate all different types of professions into a product. In the case of manatee conservation, a trading zone would be beneficial for the network of actors. The variety of actors includes Florida residents, scientists, legislatures, engineers, tourists and manatees, all with a different mindset about the subject. The passion for success will drive this network, but trading zone will keep all the actors on the same page, enhancing collaboration to achieve the common goal of preserving the manatee population.

Florida boating is currently at an all-time high. According to a report produced by the Center for Biological Diversity in 2014, policymakers were rapid authorizing water-craft projects without properly analyzing them. These projects have increased the number and size of the boats that are sharing the water with manatees. With more boats in the water, the likeliness of a manatee having a collision or being lacerated by a propeller increase. As previously stated, the largest cause of manatee death is from collision. If the size of the boats increases, the number of manatees that do survive those collision will decrease. Along the same line of the thought, the bigger the propeller, the higher chances of death rather than laceration. Having policymakers in the network will keep the idea of manatee conservation relevant and with a trading zone they will know how to correctly analyze a proposal before approving it (Florida Manatee, 2019). This will help to prevent the collision caused death rate of manatees.

Currently there is no open conversation between the engineers and scientists during the design process of propellers. To open this communication a requirement would have to be added

to the design process that involved environmental approval. There are certain constraints that exist on the design of the propeller due to the laws of nature and science, but if the engineers could work with the researchers, there could be potential for discovering an innovative, less harmful design. Jet skis, for example, utilize an impeller and suction of water to produce a jet stream of water that propels the vehicle forward. This a system that is far less harmful to the manatees than propellers because it eliminates the risk of being cut up by the metal blades. To predict the effects of these ideas a simulated test could be conducted before production. This would create a mandatory trading zone forcing the engineers and researchers to work together. It will create a constant back and forth design process. The engineers will use the researchers to get a basic understanding of the limitations and goals for the design. From that the engineers will create an effective first design to run through testing. Based on the results and feedback from researchers the engineers will make changes to the design and re-test. This process of testing and redesign will continue until a design is created that satisfies both groups. Once this idea passes final testing and approved as safe for the manatees and their habitats then production can happen. With this operable trading zone, the boat design engineers would be an active actor in the network.

A trading zone would also be effective with solving the issue of climate change on manatee's habitat. Since manatees are native to the warm waters around the coast of Florida, cold snaps caused by fluctuations in the temperature of sea water has become a fatal threat to the manatees. Climate change has been linked to the increased number of hurricanes and red-tide algal blooms (Florida Manatee, 2019). These natural disasters negatively affect manatees through the disruption of their habitat and physical harm to the sea level grazing manatees. The state of Florida has recognized and taken action through policies in attempt to limit climate

change effects since 2006. Most actions were taken through the passing of bills that limited in the amount of energy used and inventoried the amounts of greenhouse gas produced. The Florida Energy Commission was established in 2007 and tracked the progress of the bills, setting reachable goals. This system continued until the election of Governor Rick Scott where primary responsibility shifted from state level to local governments (Ruppert & Deady). The main focus was set on rapid recovery and disaster planning, rather than attacking climate change top down. This change in plan stemmed from Scott's resistance to believing in climate change (Sun Sentinel Corporate Board, 2020). While this approach is better than no action, it removes climate change from critical focus. With a trading zone, attention could be brought back to the policymakers about climate change. Having the direct conversation between researchers, local, and state governments keeps the discussion open. They will still be able to handle the fallout of disasters but will be more inclined to take precautions. If policymakers fully understand the scientific effects of climate change on manatees and how the damage can be lessened, they will be able to create appropriate and effective regulations to fight it. This shows true to current day. As mentioned, previous governor, now senator, Rick Scott was initially hesitant on climate change and the policies involving it. Now with more understanding and research found by current governor Ron DeSantis, Scott and the rest of Florida legislature is interested in taking preventative action. This shows how information and trading zones can have an effect in policymaking (Sun Sentinel Corporate Board, 2020).

Conclusion:

The Actor Network Theory proposes a strategy for an activist community to be built and have an influence on society. For the network to be existing, all actors mentioned must be active in their departments and dedicated to making an impact. For manatees, they were here long

before humans and the earth we live on is as much their home as it ours. Even though society today places humans on top of the food chain**,** all species and ecosystems are equally as crucial, thus should be treated as such. Manatees are herbivores and keep the amount of shallow growing plant life in check. Without any serious natural predators, Manatees' main causes of death come from human actions (Lindell, 2020). These human-related harms are either boat collisions or climate change effects. Although both dangers are equally important but working with the recreational boating community will have immediate results, whereas climate change takes longer. There is a compromise that includes manatees living in a safe environment while humans enjoy the fun of water recreation. A network would include all major players that have a hand in reaching that compromise. It will get all parties on the same page and allow them to put all their efforts toward reaching that goal most effectively. All actors will stay current on the issues facing the manatee community, be utilizing trading zones to efficiently gather external expertise, and making a change for the manatees. Overall, the final goal is to create policies that limit the climate change effect on the manatee's habitats, enforce the polices already in place to ensure manatee safety and find a solution for boaters so a safe environment can be created. This may include a safe driving incentive, or a new propeller-type invention. At the end of it, hopefully, everyone will be able to live their best lives.

In furthering this area of research, it would be interesting to see if there are other networks currently formed for an endangered species and compare to this one. There are over fifteen thousand species on the endangered list across the world. Looking into how other organizations are approaching this, whether they institute an actor network theory, utilize trading zones, and their success. With this information the network can be optimized and improved.

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