

THE IMPACT OF THE GLOBAL TIGER RECOVERY PROGRAM ON WILDLIFE  
CRIME

by

Sudha Balajapalli  
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## **DEDICATION**

This is dedicated to my loving family.

## **ACKNOWLEDGEMENTS**

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## TABLE OF CONTENTS

	Page
List of Tables .....	vi
List of Figures .....	vi
List of Equations .....	viii
List of Abbreviations .....	ix
Abstract .....	xi
Introduction .....	1
Methods .....	11
Results .....	15
Discussion .....	28
Conclusion .....	47
References .....	49

## LIST OF TABLES

Table 1 Regression Analysis.....	21
----------------------------------	----

## LIST OF FIGURES

	Page
Figure 1: Figure 1: Bangladesh and Nepal Total SRCWP Funding for per year .....	16
Figure 2: Bangladesh SRCWP Funding per month/year.....	16
Figure 3: Nepal SRCWP Funding per month/year .....	17
Figure 4: Bangladesh Tigers Seized per Year.....	18
Figure 5: Nepal Tigers Seized per year.....	18
Figure 6: Tiger Abundance Index per year.....	19
Figure 7: Tiger Population Numbers per year.....	20
Figure 8: Bangladesh SRCWP funding and the number of tigers seized.....	22
Figure 9: Nepal SRCWP funding and the number of tigers seized.....	23
Figure 10: Bangladesh tiger abundance index and the number of tigers seized.....	25
Figure 11: Nepal tiger population numbers and the number of tigers seized.....	27



## LIST OF EQUATIONS

	Page
Equation 1 Prediction Equation .....	20

## LIST OF ABBREVIATIONS

Asian Ministerial Conference.....	AMC
Association of Southeast Asian Nations- Wildlife Enforcement Network.....	ASEAN-WEN
Bangladesh CITES Management Authority.....	Authority
Bangladesh Forest Department .....	BFD
Convention on International Trade in Endangered Species of Wild Fauna and Flora... ..	CITES
Department of Forests.....	DOF
Department of National Parks and Wildlife Conservation.....	DNPWC
Education for Nature Vietnam.....	ENV
Environmental Investigation Agency.....	EIA
Generalized Linear Models.....	GLM
Global Environmental Fund.....	GEF
Global Positioning System.....	GPS
Global Tiger Initiative.....	GTI
Global Tiger Recovery Program.....	GTRP
Golden Triangle Special Economic Zone.....	GT-SEZ
Government of Bangladesh.....	GoB
Government of Nepal.....	GoN
International Criminal Police Organization.....	INTERPOL
International Development Assistance.....	IDA
International Fund for Animal Welfare.....	IFAW
International Union for Conservation of Nature.....	IUCN
Kilograms.....	.kg
Kilometers.....	.km
Ministry of Environment and Forest.....	MOEF
Ministry of Forest and Soil Conservation.....	MOFSC
National Trust for Nature Conservation.....	NTNC
Non-Governmental Organizations.....	NGOs
Rapid Action Battalion.....	RAB
Smithsonian Institution.....	SI
Spatial Monitoring and Reporting Tools.....	SMART
Strengthening Regional Cooperation for Wildlife Protection Asia.....	SRCWP
Tiger Range Countries .....	TRCs
The Wildlife Trade Monitoring Network.....	TRAFFIC

United Nation Convention against Transnational Organized Crime.....	UNTOC
United Nations Convention against Corruption.....	UNCAC
United Nations Office of Drugs and Crime.....	UNODC
United States Dollar.....	USD
Unmanned Aerial vehicles.....	UAVs
Village Tiger Response Team.....	VTRT
Wildlife Conservation of Nepal.....	WCN
Wildlife Crime Control Bureau .....	WCCB
Wildlife Crime Control Units.....	WCCU
World Wildlife Fund –Nepal.....	WWF-Nepal

## **ABSTRACT**

### **THE IMPACT OF THE GLOBAL TIGER RECOVERY PROGRAM ON WILDLIFE CRIME**

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George Mason University, 2015

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At the end of the 19<sup>th</sup> century, there were 100,000 wild tigers (Wikramanayake et al., 2011). Today, there are 3,200-3,600 wild tigers (Seidensticker, 2010). Next to habitat destruction, wildlife crime is the second-largest direct threat to wildlife (WWF, 2015a). The Global Tiger Recovery Program (GTRP) aims to double the current tiger population numbers by 2022. One GTRP goal is to eliminate poaching, illegal trade, and trafficking in wild tigers and their derivatives (GTRP, 2010). The objectives of this study are to test whether strengthening law enforcement efforts through additional funding increased tiger seizures and to explore whether legislative, social, and/or leadership factors increased tiger seizures; Bangladesh and Nepal served as case study countries. A metric used to measure law enforcement efforts was tiger seizures in both countries (Stoner and Pervushina, 2013). Strengthening Regional Cooperation for Wildlife Protection (SRCWP) funding was used to assess funding for tiger protection. Population trends were

assessed using tiger survey data in Nepal and tiger abundance index data in Bangladesh. In both countries, the results indicated that there was a possible negative relationship between SRCWP funding and the number of tigers seized. In Bangladesh, there was a possible negative relationship between the tiger abundance index and the number of tigers seized. In Nepal, there was a possible positive relationship between tiger population numbers and the number of tigers seized. There was insufficient information and data to accurately assess the relationship between tiger seizures, SRCWP funding, and tiger population trends. Based on the best available information, suggestions were developed to enhance the effectiveness of SRCWP funding and project implementation. Additionally, national wildlife legislation, its integration of CITES, and social and leadership factors were examined to improve tiger protection and strengthen law enforcement in both countries.

## INTRODUCTION

### *Background*

At the end of 19<sup>th</sup> century, there were 100,000 wild tigers (*Panthera tigris*, Linnaeus 1758) living in Asia (Wikramanayake et al., 2011). The historical range of tigers encompassed 13 different Asian countries that made up 93 percent of their range (Chundawat et al., 2011). There are nine known tiger subspecies: *Panthera tigris tigris* (Bengal), *Panthera tigris corbetti* (Indochinese), *Panthera tigris sumatrae* (Sumatran), *Panthera tigris altaica* (Siberian/Amur), *Panthera tigris jacksoni* (Malayan), *Panthera tigris amoyensis* (South-China), *Panthera tigris sondaica* (Javan), *Panthera tigris virgata* (Caspian), and *Panthera tigris balica* (Bali) (Driscoll et al., 2012). The presence of tigers indicates a healthy ecosystem that can positively affect population dynamics, preserve genetic diversity, and prevent climate change. Culturally, many Asian countries view the tiger as a symbol of strength, grace, and power (GTRP, 2010).

Threats to tigers include habitat destruction, poaching, illegal trade, and human-tiger conflict (Chundawat et al., 2011). Today, the total tiger range is 7 percent of its historical range (Driscoll et al., 2012), and the global population has declined to 3,200–3,600 wild tigers (Seidensticker, 2010). Moreover, three of the nine tiger subspecies are now extinct—Bali, Caspian, and Javan—and the South-China tiger has not been observed in the wild within the last decade (Driscoll et al., 2012). Currently, tigers are

found in the countries of Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao, Malaysia, Myanmar, Nepal, Russia, Thailand, and Vietnam, which are collectively known as Tiger Range Countries (TRCs).

### *Historical Tiger Conservation Response*

In the 1960s, the earliest tiger conservation actions focused on the tiger image. Globally, images of tigers attacking livestock or man-eating tigers were prevalent perceptions. Many conservation efforts were focused on redefining the tiger image as a rare and charismatic animal, rather than a dangerous predator. Many of these conservation efforts were ineffective and unable to prevent the extinction of the Javan and Caspian tigers, which occurred during this period. In 1969, the International Union for Conservation of Nature (IUCN) listed all remaining tiger subspecies as endangered (Seidensticker, 2010).

In 1973, the tiger was listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) under Appendix I. CITES regulates international trade in all endangered species. CITES focused on removing tiger skin and furs from legal international commercial trade, and, as a result, spotted and striped cat skins and furs were successfully removed from European and U.S. fashion markets. Furthermore, many TRC governments implemented tiger conservation initiatives at the national level that included 1) enforcing bans on sport hunting, 2) implementing national policies on wildlife protection, 3) creating and expanding protected areas, 4) strengthening administrative and law enforcement support, 5) establishing community outreach programs, 6) conducting tiger surveys, and 7)

researching tiger habitats, prey dynamics, and population structures. One major disadvantage that the TRCs faced was a lack of financial and scientific resources to effectively protect the tiger (Seidensticker, 2010).

In the 1980s, these national-level conservation policies paved the way to top-down management strategy. The top-down conservation strategy severely prohibited or limited human use of protected areas (Barrett et al., 2001). Furthermore, local communities were omitted from the wildlife decision-making process. Ludwig et al. (1993) and Brandon et al. (1998) explained that top-down conservation practices were ineffective in enforcing laws and failed to conserve biodiversity because they marginalized local communities. The marginalization of rural communities by the central governments led to an increase in criminal activities, such as poaching, illegal trade, and wildlife crime. The TRC governments were incapable of coping with the increased criminal activities (Seidensticker, 2010), and this led to the further decline in tiger populations.

In the 1990s, many conservationists advocated the bottom-up conservation strategy. This approach advocated community involvement in wildlife decision-making and enforcement (Barrett et al., 2001). The idea was to make biodiversity more valuable to the local communities so they would do more to conserve it (Western and Wright, 1994; Getz et al., 1999). This approach was first championed by many non-governmental organizations (NGOs) working in the TRCs. The NGOs offered compensation programs for livestock losses, worked with local communities on tiger education, and relocated people out of protected areas. Furthermore, there were many scientific breakthroughs



dealing with tiger biology and ecology during this decade. For example, there was a better understanding of predator/prey dynamics, ecological parameters, and tracking tiger movements. The creation of buffer zones and corridors were also established to improve connectivity between protected areas, and there was a global assessment project that gathered information using global information systems and remote sensing devices. These scientific breakthroughs led to development of a landscape management approach (Seidensticker, 2010).

In the 2000s, the development of cooperative international platforms began. The Malaysian Conservation Alliance for Tigers partnered with the Malaysian government and NGOs to develop a tiger action plan aimed at doubling the Malayan tiger population. A similar platform was developed in Bangladesh (Seidensticker, 2010). In 2008, the Smithsonian Institution (SI), the World Bank Group, Save the Tiger Fund, and the Global Environmental Fund (GEF) came together in partnership to create the Global Tiger Initiative (GTI) (Nyhus and Tekancic, 2010) with the mission of forming a global alliance to save wild tigers from extinction (GTI, 2015). GTI facilitated several international conferences and workshops to combat the tiger population decline, and the pledges, recommendations, and conclusions reached at these conferences became the St. Petersburg Declaration on Tiger Conservation of 2010.

#### *Mechanisms Involved in the Global Tiger Recovery Program*

There were four mechanisms that led to the St. Petersburg Declaration: 1) the Manifesto on Combating Wildlife Crime in Asia; 2) the Recommendations of the Kathmandu Global Tiger Workshop; 3) the Hua Hin Declaration on Tiger Conservation

at the 1<sup>st</sup> Asian Ministerial Conference (AMC); and 4) the Pre Tiger Summit Work Plan. In April 2009, the Manifesto on Combating Wildlife Crime in Asia took place in Pattaya, Thailand. Experts and representatives from 21 different countries, 12 intergovernmental organizations, and 29 NGOs attended this international workshop. The primary goal was to start a wildlife enforcement network to mitigate wildlife crime; other goals included immediate ratification and implementation of CITES, United Nation Convention against Transnational Organized Crime (UNTOC), and United Nations Convention against Corruption (UNCAC) in all TRCs. Furthermore, technical, financial, and training resources needed by law enforcement were discussed (Manifesto on Combating Wildlife Crime in Asia, 2009).

In October 2009, more than 250 tiger experts and participants from TRCs attended the Global Tiger Workshop in Kathmandu, Nepal. Some of the recommendations from this workshop included the protection of core breeding areas, better conservation and management of buffer zones and corridors, better monitoring and assessing, and conducting outreach programs in local communities. The implementation of CITES in all range countries was again discussed in an effort to improve the enforcement of laws directed at combating illegal wildlife trade (Kathmandu Global Tiger Workshop, 2009).

In January 2010, the Hua Hin Declaration on Tiger Conservation at the 1<sup>st</sup> AMC was held in Hua Hin, Thailand. This was the first time the TRCs expressed an interest to double the tiger population by 2022, a date selected because it is the year of the tiger. Other recommendations included implementing new patrolling and monitoring programs,

assisting each other with donor tigers, and permanently financing the Association of Southeast Asian Nations-Wildlife Enforcement Network (ASEAN-WEN) (Asia Ministerial Conference on Tiger Conservation, 2010).

In July 2010, the Pre Tiger Summit Work Plan took place in Bali, Indonesia. Many NGOs, scientists, and representatives from TRCs attended the workshops. The main goal of the Pre Tiger Summit was to write a draft Global Tiger Recovery Program (GTRP), the proposed action plan that was adopted in St. Petersburg, Russia (Pre-Tiger Summit, 2010).

#### *Global Tiger Recovery Program*

In November 2010, representatives from all the TRC governments met in St. Petersburg, Russia, to sign the GTRP. Key players involved in the GTRP were the TRC governments, the World Bank Group, GTI, GEF, Save the Tiger Fund, SI, US Fish & Wildlife Service, Wildlife Conservation Society, and World Wild Fund for Nature. The main goal of the GTRP was to double the tiger populations in range countries by the year 2022, and its objectives included the following: 1) effectively manage, preserve, protect, and enhance tiger habitats; 2) eradicate poaching, smuggling, and illegal trade of tigers and their derivatives; 3) cooperate on combating illegal trade and management of transboundary landscapes; 4) engage with local communities on tiger issues; 5) increase the effectiveness of tiger and habitat management; and 6) restore tigers to their former range. GTRP correctly identified wildlife crime as one of the biggest threats to wild tigers and consumer demand as the main reason for poaching, illegal trade, and wildlife trafficking (GTRP, 2010).

The GTRP's wildlife crime initiative required all range countries working collaboratively to eliminate poaching, illegal trade, and wildlife traffic in wild tigers and their derivatives. To achieve this initiative the following recommendations were made: 1) implementation of stronger or stricter penalties against poaching, illegal purchase, sale, and transportation of tigers and their derivatives; 2) establishment of a Wildlife Crime Control Bureau in all range countries; 3) utilization of ASEAN-WEN as a model for better regional and international law enforcement cooperation; and 4) improved cooperation between range governments and CITES, the wildlife trade monitoring network (TRAFFIC), and International Criminal Police Organization (INTERPOL) (GTRP, 2010). Additionally, range and non-range countries needed to improve international collaboration, coordination, and communication.

### *Wildlife Crime*

Wildlife crime is the illegal taking, possession, trade, or movement of animals, plants, and their derivatives (Cooper and Cooper, 2007; Lawton and Cooper, 2009). Next to habitat destruction, wildlife crime is the second-largest direct threat to wildlife (WWF, 2015a). Wildlife crime is highly profitable enterprise yielding 8–10 billion U.S. dollars annually (UNDOC, 2015). A major driver of wildlife crime is illicit demand (WWF, 2015a), which is often categorized by three types of wildlife product users. The first type is a medicinal user who views the wildlife product as having a cultural or holistic value and uses wildlife products to remedy different physical ailments. The second type is a collector who views the wildlife product as having an aesthetic value. They collect jewelry, crafts, art, and fashion made out of wildlife products (WWF/Dalberg, 2012). The

third type of wildlife product user is a consumer of wild meat. Many people consume wild meat for nutrition or part of their daily diet, and the consumption of wild meat is used as a medium to communicate social prestige and leverage in some parts of the Asia (Drury, 2011). Zain (2012) explained that legislation, law enforcement, supply and prices, personal beliefs, peer pressures, and group norms all influence the illicit demand for wildlife products.

Wildlife crime occurs in places where corruption is rampant, law enforcement is weak, and there are few economic opportunities (WWF/Dalberg, 2012). Nations that suffer from rampant corruption have few institutional checks and balances, and they provide little financial resources and support for law enforcement activity. Additionally, these nations have weak civil societies and widespread poverty. Often, the risk involved in committing wildlife crime is minimal because of weak law enforcement and corruption, while the potential profit from wildlife crime is high and appealing to people with limited economic opportunities. This situation creates the perfect environment for wildlife crime.

There are many different players that facilitate wildlife crime. Local people living in or around protected areas are approached and financed by middlemen to poach wildlife. The middlemen are financed by the local criminal or rebel elements, which are also involved in narcotics, firearms, and human trafficking. In turn, the criminal and rebel elements are financed by clients in consumer countries. Often, these different players are ignorant of wildlife legislation or policies that protect wildlife (WWF/Dalberg, 2012).

The first line of defense to protect wildlife is national wildlife legislation because such legislation empowers local law enforcement to combat wildlife crime. When there is weak wildlife legislation, law enforcement is ineffective and wildlife protection is reduced. To bolster the protection of wildlife, international treaties such as CITES were established. CITES became the principle strategy to combat international illegal trade in all endangered species (Hutton and Dickson, 2000; Broad et al., 2003). In recent years, there has been an increase in trade of many CITES listed species (Rosen and Smith, 2010; Challender, 2011; Milliken and Shaw, 2012; NTCA, 2012; Underwood et al., 2013). From July 1996 to October 2008, there were 191,934 live animals seized worldwide and 76 percent of the animals seized were CITES Appendix I or II listed species. Additionally, 26 percent of the animal seizures were tiger and leopard skins, pelts, and furs (Rosen and Smith, 2010). Between 2000 and 2012, a total of 654 tiger parts and 1425 live tigers were seized across the range countries (Stoner and Pervushina 2013).

Today, many tiger populations live in protected areas where poaching is prevalent (Karnath and Nichols, 1998). Horev et al. (2012) explained that if poaching increased from two to four tigers annually, the extinction probability will also increase from 2.2 to 62.6 percent in populations over 100 tigers. The poaching of six tigers annually can cause extinction of an entire population within 21.5 years in a population of more than 100 tigers (Horev et al., 2012). Tiger populations will decline if more than 15 percent of the breeding female tigers die every year (Chapron et al., 2008). Horev et al. (2012) concluded that female tigers are not the only limiting factors in population extinction;

male tigers also play an important role in the growth of populations. Poaching not only leads to tiger extinction, but it can reduce genetic variability by increasing the inbreeding coefficient. Inbreeding then leads to a reduction in fitness, which makes tigers more susceptible to environmental changes and disease (Kenny et al., 1995).

### *Objective*

One of GTRP's goals is to eliminate poaching, illegal trade, and wildlife trafficking of wild tigers and their derivatives. This paper examines if this goal is possible considering the immense amount of poaching, illegal trade, and wildlife trafficking pressures encountered by wild tigers. The objectives of this study are to test whether strengthening law enforcement efforts through additional funding increased tiger seizures and to explore whether legislative, social, and/or leadership factors increased tiger seizures; Bangladesh and Nepal served as case study countries. Tiger seizures were used as a metric to measure law enforcement efforts (Stoner and Pervushina, 2013). Strengthening Regional Cooperation for Wildlife Protection (SRCWP) funding was used to assess funding for tiger protection. Population trends were drawn from tiger survey data in Nepal and tiger abundance index data in Bangladesh.

## METHODOLOGY

### *Data Collection*

Data and information were collected and compiled from a variety of secondary sources. There are many donors that contribute to GTRP funding for wildlife crime; however, this study focused on one particular International Development Assistance (IDA) project called Strengthening Regional Cooperation for Wildlife Protection in Asia (SRCWP). In April 2011, SRCWP funding was approved for Bangladesh and Nepal. The objectives of the SRCWP project were to build capacity by addressing illegal wildlife trade through regional cooperation and promote habitat protection and management through regional conservation and addressing human-wildlife conflict. Bangladesh was approved for 36 million U.S. dollars (USD) in grants and loans, while Nepal was approved for 3 million in USD grants (World Bank Group, 2015b).

In Bangladesh, tiger seizure data and information was collected from the Government of Bangladesh (GoB) and *The Daily Star* (Bangladeshi English newspaper) for the years of 2004–2014. In Bangladesh, there was no recorded evidence of tiger poaching in 2005, 2007, 2008, and 2010. Additionally there was a tiger poaching incident in 2013, but there were no details regarding what items were seized. As a result of the missing data for the years 2005, 2007, 2008, 2010 and 2013, these years were left out in the analysis. In Nepal, tiger seizure data and information was collected from the



Government of Nepal (GoN), Wildlife Conservation Nepal (WCN), World Wildlife Fund – Nepal (WWF-Nepal), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) trade database, and the wildlife trade monitoring network (TRAFFIC), for the years of 2002–2014. Not all tiger poaching incidents and items seized were identical; the items seized in Bangladesh and Nepal included live tigers, and tiger skins, skulls, bones, meat, and teeth. In order to render the seizure data comparable, only live tigers, and tiger skins, skulls, and kilograms of bones were included in the final analysis, and they were converted into the equivalent of one whole tiger. For the purposes of this analysis, one skin, skull, live tiger, or 10 kilograms of bone was considered to represent a single whole tiger (Jenkins, 2006; Nowell and Xu, 2007; Stoner and Pervushina, 2013).

In Bangladesh, the tiger abundance index was considered to be the best available Sunderbans tiger population trend indicator. The relative tiger abundance index study was conducted by Bangladesh Forest Department and Wildlife Trust of Bangladesh, now known as WildTeam. In the Sunderbans, tiger tracks are often observed on the muddy banks of creeks called *khal*. A track set is a group of tracks either going up or down a creek bank where a tiger has crossed. In general, tigers do not walk parallel to the *khal* along the sloping bank. The tiger abundance index was calculated by using the median number of tiger tracks counted per kilometer (km) of the *khal* survey transect (Barlow et al., 2008). Thus, the tiger abundance index is a measure of tiger activity, not the actual population size. From 2007 to 2012, the relative tiger abundance indices were collected and used in the analysis. There was no tiger abundance index collected for the year 2008

and this observation was left out of the analysis. In Nepal, the tiger population numbers were collected from tiger surveys conducted by GoN – Department of National Parks and Wildlife Conservation and WWF-Nepal. Tiger surveys were collected for the years 1998, 2000, 2005, 2010, and 2013 and used in the analysis.

### *Bangladesh*

The People's Republic of Bangladesh is located in Southeast Asia between 20° 34' and 26° 38' north latitude and between 88° 01' and 92° 41' east longitude. The climate of Bangladesh is sub-tropical and the average rainfall varies between 1,200 and 3,500 mm per year. Bangladesh's geography is dominated by the low-lying Ganges delta, with highlands in the north and southeast region that encompass 147,570 sq. km. It has 57 trans-boundary rivers, which create some of the most fertile plains in the world. Bangladesh's human population is 136 million (Bangladesh Forest Department, 2015), and the wildlife of Bangladesh is diverse, consisting of 113 species of mammals, 628 birds, 126 reptiles, 708 fish, and 22 amphibians (Khan, 2008). Major environmental problems include deforestation, pollution, wildlife conservation, flooding, and soil erosion, many of which are exacerbated by climate change (UNODC, 2013). Most of the tiger habitat is located in the Sunderbans, the world's largest mangrove forest, encompassing 6,017 sq. km, (UNODC, 2013). Most conservationists believe that there are as few as 200 tigers left in the Sunderbans (Khan, 2012).

### *Nepal*

The Federal Democratic Republic of Nepal is located in Southeast Asia between 26° 12' and 30° 27' north latitude and 80° 4' and 88° 12' east longitude (Central

Intelligence Agency, 2015). The country's climate ranges from sub-tropical in the lowlands to arctic in higher altitudes, and the average rainfall is 1,500 mm per year (World Bank Group, 2015a). Nepal's geography is divided into three regions—mountain, hill, and Terai—and encompasses 147,181 sq. km. The mountain region is located in northern part of the country near the Himalayan Range. Some the world's highest elevations are located in Nepal, including Mount Everest. Nepal's human population is about 27 million and is located in the Nepalese hills, a region that includes the area from the mountains to the subtropical river valleys. The Terai, meaning “lowland” in Sanskrit, borders the northern rim of the Indo-Ganges plain (Central Intelligence Agency, 2015). The biodiversity of Nepal includes 208 species of mammals, 867 birds, 123 reptiles, 230 fish, and 117 amphibians (Government of Nepal, 2014). The environmental problems consist of deforestation, water pollution, wildlife conservation, and carbon dioxide emissions (Central Intelligence Agency, 2015). All of the occupied tiger habitat is exclusively located in the Terai and encompasses 3,254 sq. km (Government of Nepal, 2015). In 2013, the tiger population was estimated at 198 (WWF-Nepal, 2015).

## **RESULTS**

### *Data*

Both Nepal and Bangladesh received funding from the International Development Assistance (IDA) project called Strengthening Regional Cooperation for Wildlife Protection in Asia (SRCWP). Bangladesh was approved for 36 million in U.S. dollars (USD) grants and loans, while Nepal was approved for 3 million in USD grants. In Figure 1, the SRCWP funding was plotted against years. As of 2014, a total disbursement for both countries was approximately 12,823,564.83 million USD. In Figure 2 and 3 the SRCWP funding was plotted against month/year. Bangladesh received approximately 11,055,853.59 million USD, while Nepal received approximately 1,767,711.24 million USD.

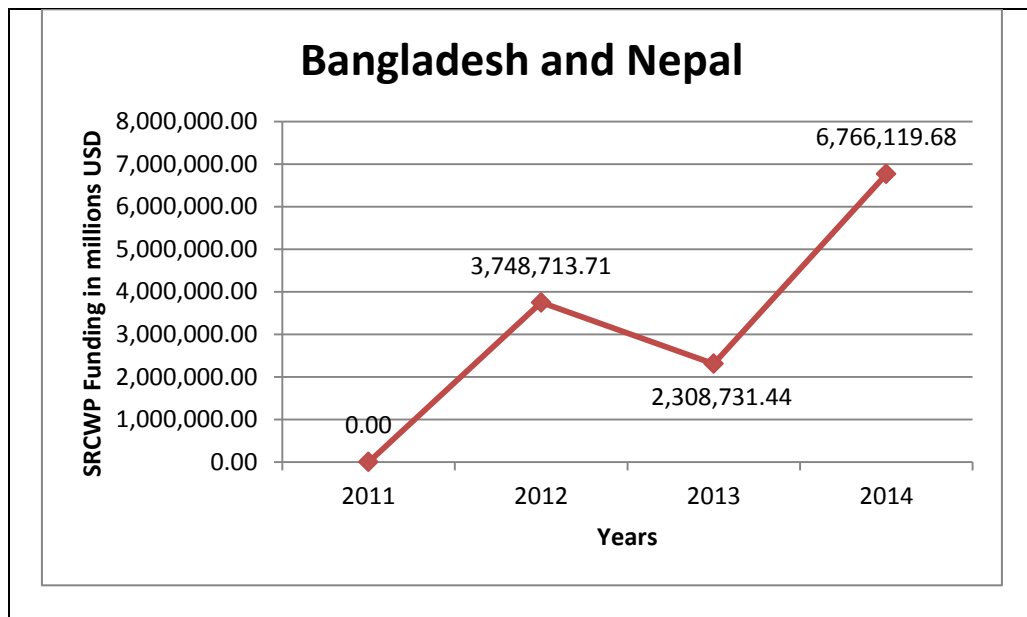


Figure 1: Total SRCWP funding for Bangladesh and Nepal per year.

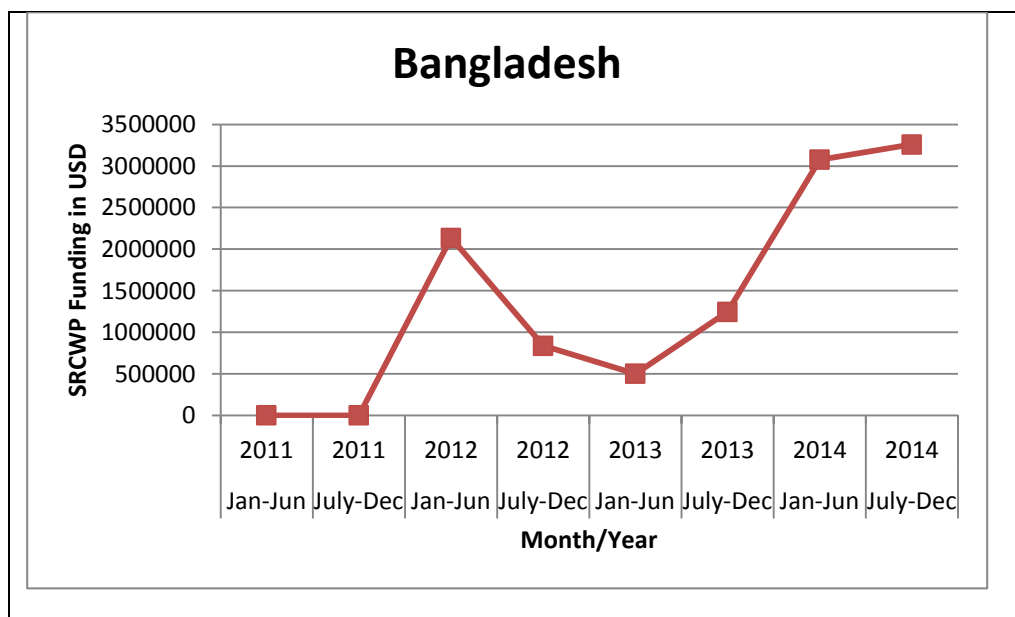


Figure 2: Bangladesh SRCWP funding per month/year.

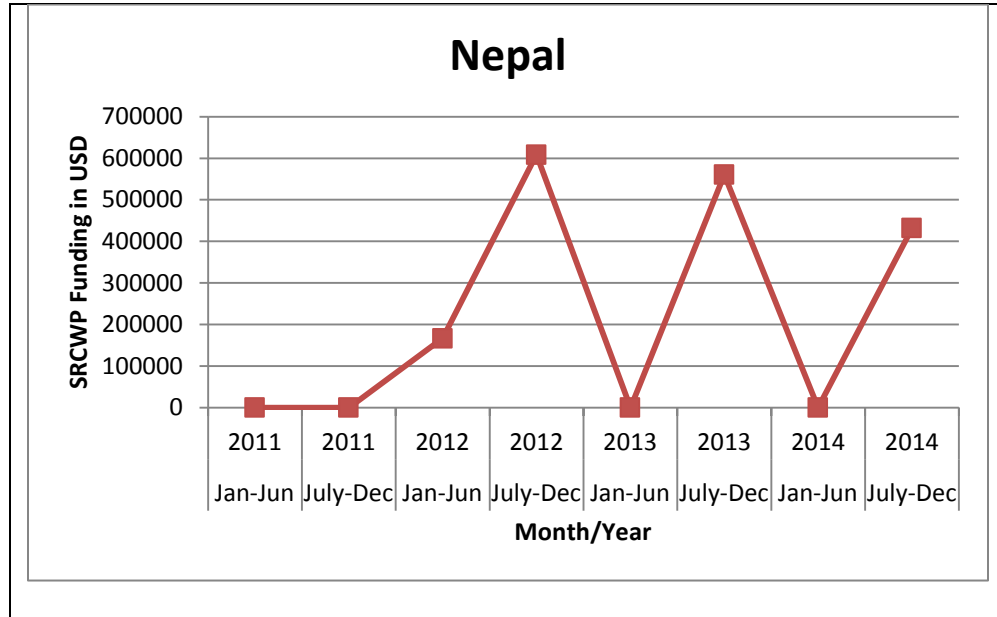


Figure 3: Nepal SRCWP funding per month/year.

For Nepal and Bangladesh tiger seizures were converted into whole tigers. For example, one skin, skull, live tiger or 10kg of bone was considered to represent one tiger (Jenkins, 2006; Nowell and Xu, 2007; Stoner and Pervushina, 2013). In Figure 4 and 5, the number of tigers seized was plotted against years for Bangladesh and Nepal.



Figure 4: Bangladesh number of tiger seized per year.

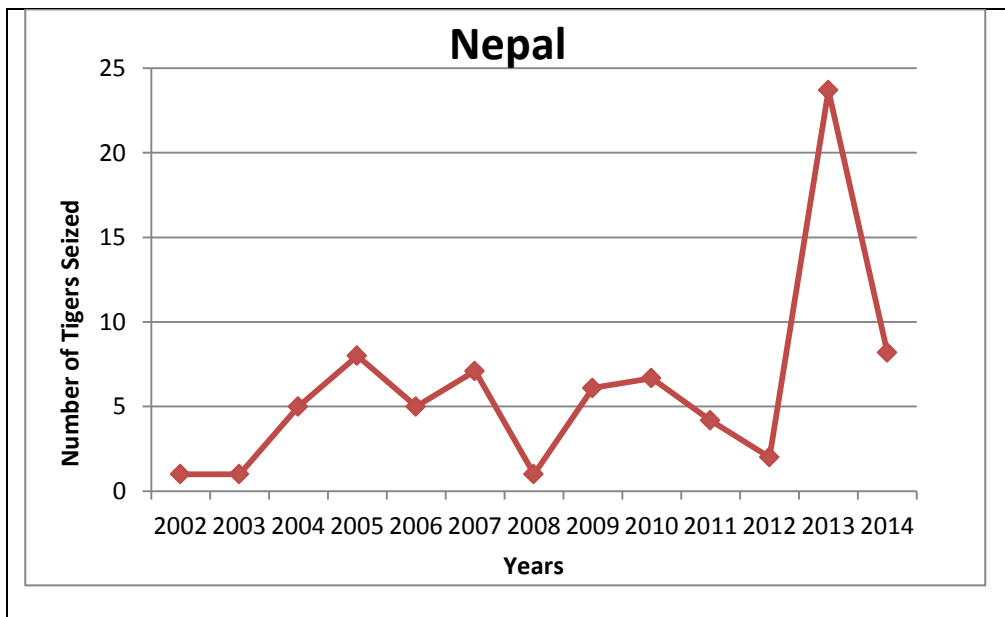


Figure 5: Nepal the number of tiger seized per year.

For Figure 6, the tiger abundance index (median of tiger tracks/ km of *khal*/ sq.km of area) was plotted against years for Bangladesh.

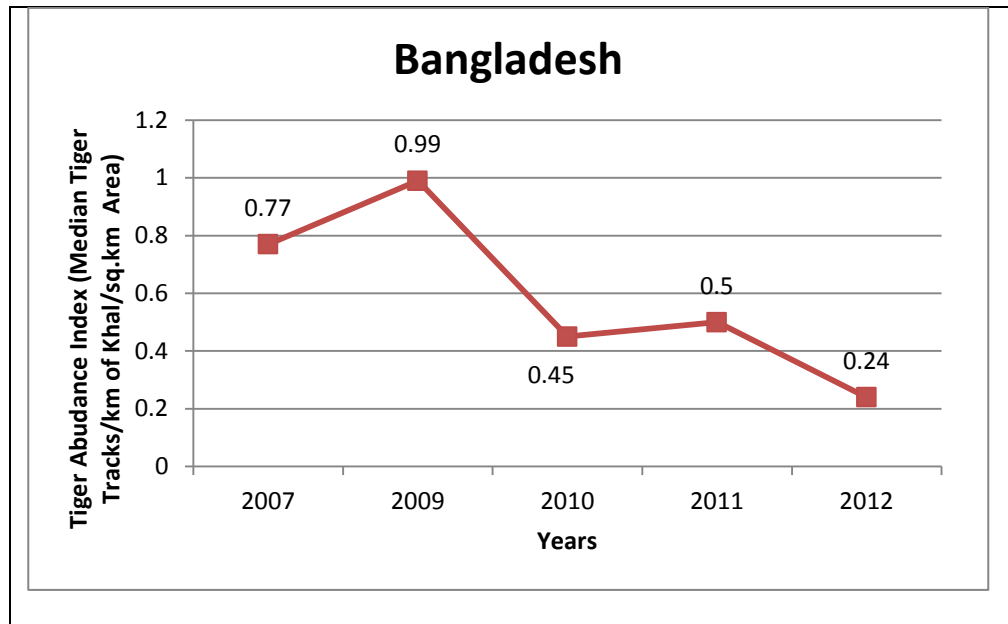


Figure 6: Tiger abundance index per year.

For Figure 7, the tiger population numbers were plotted against years for Nepal.



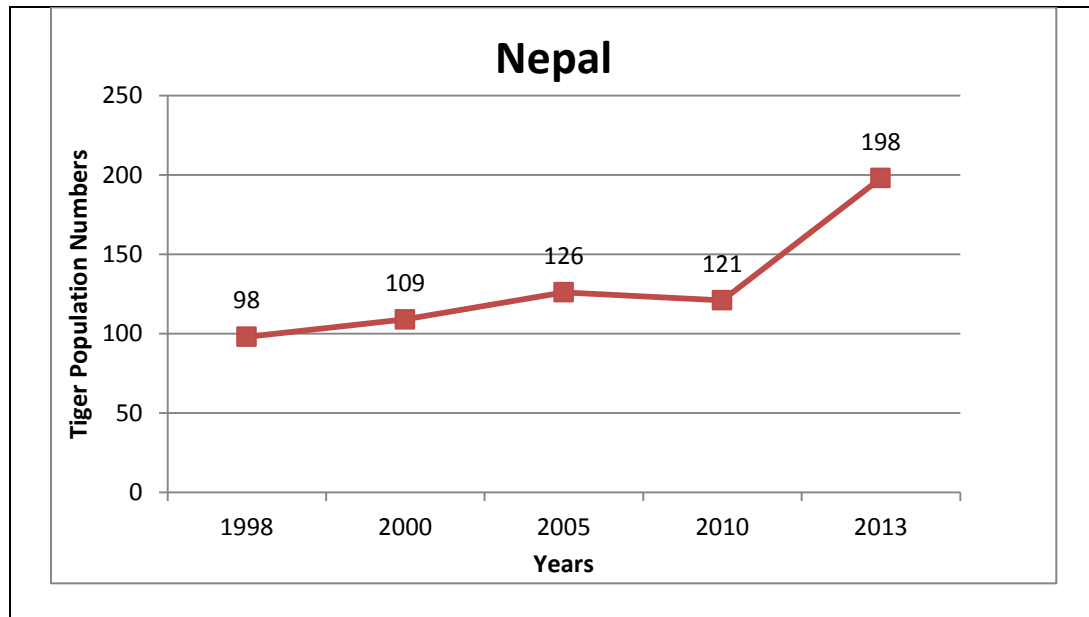


Figure 7: Tiger population numbers per year.

### *Regression Analysis*

R version 3.2.1 software was used to develop four General Linear Models (GLMs). The GLMs tested the impact of SRCWP funding, tiger abundance index, and tiger population numbers on tiger seizures. Four GLMs were run as opposed to two models because the disbursement varied by year and month for both countries, and it would be inconsistent to compare tiger abundance index (measures activity) to tiger population numbers. The four GLMs used a Poisson distribution because the outcomes were count data. Each model generated predicted values using the following regression equation:  $E(Y|X) = \exp(\beta_0 + \beta_1 X)$ . A line was drawn through the predicted value to show possible trends in the given model. In each model, two parameters are estimated--  $\beta_0$  and  $\beta_1$ . Table 1 is the summary output of the four GLMs.

Table 1: Regression Analysis

Country	Variable	$\beta_0$	$\beta_1$	p-value	Degree of freedom
<b>Bangladesh</b>	SRCWP Funding	1.8940	-7.237e-07	0.0019	6
<b>Nepal</b>	SRCWP Funding	1.8920	-3.254e-06	0.0020	6
<b>Bangladesh</b>	Tiger Abundance Index	2.4802	-1.6203	0.0565	3
<b>Nepal</b>	Tiger Population Numbers	0.0813	0.0156	0.0004	1

#### *Funding and Seizures*

For both Bangladesh and Nepal, the predicted lines show a possible negative relationship between SRCWP funding and the number of tiger seized. In Figures 8 and 9, the low p-value suggests a possible relationship between the two variables in the given models. Figures 8 and 9 also indicate as SRCWP funding increased, the number of tiger seized decreased. Due to the small dataset, all observations were considered in the final analysis.

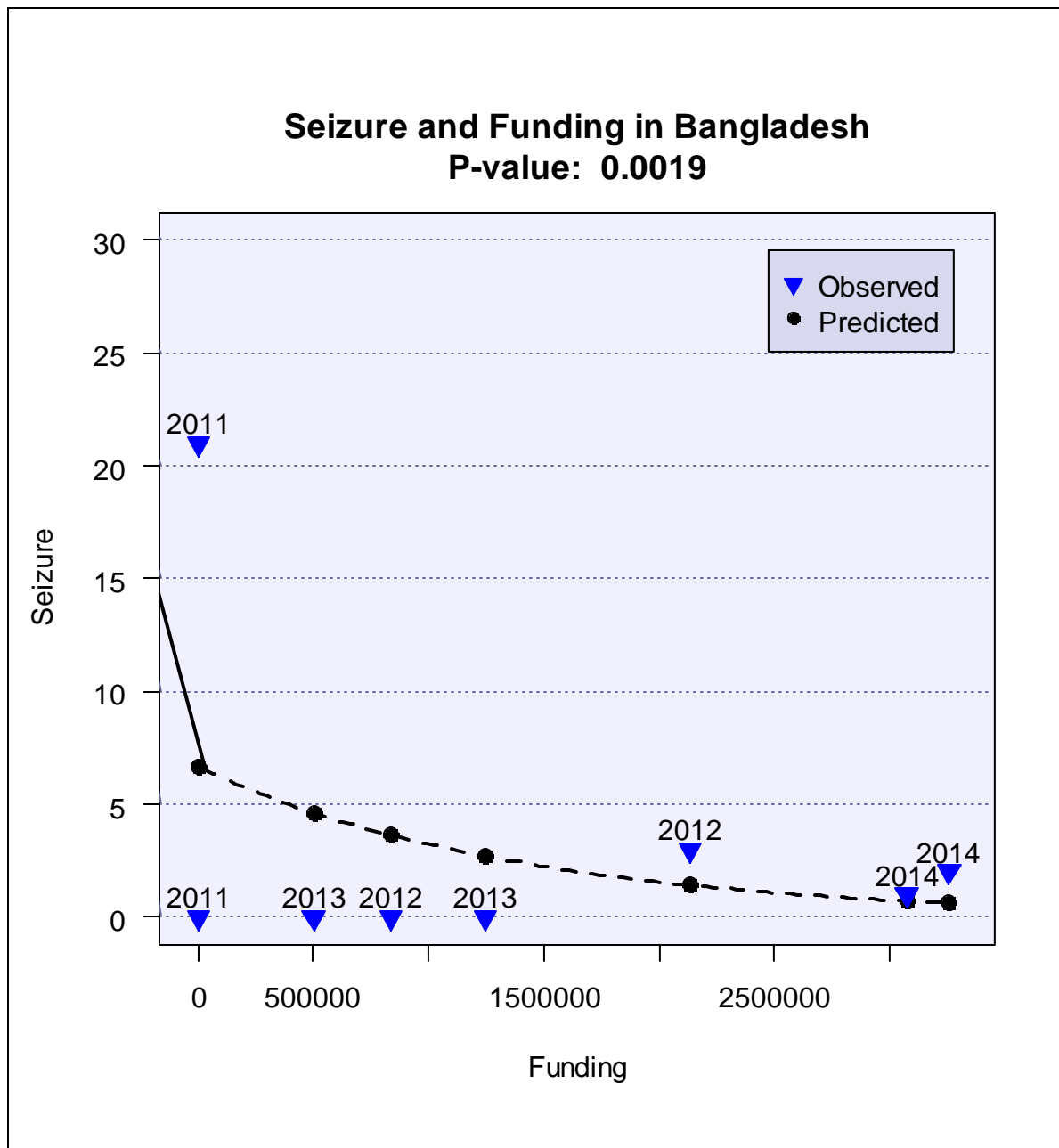


Figure 8: Bangladesh SRCWP funding and the number of tigers seized.

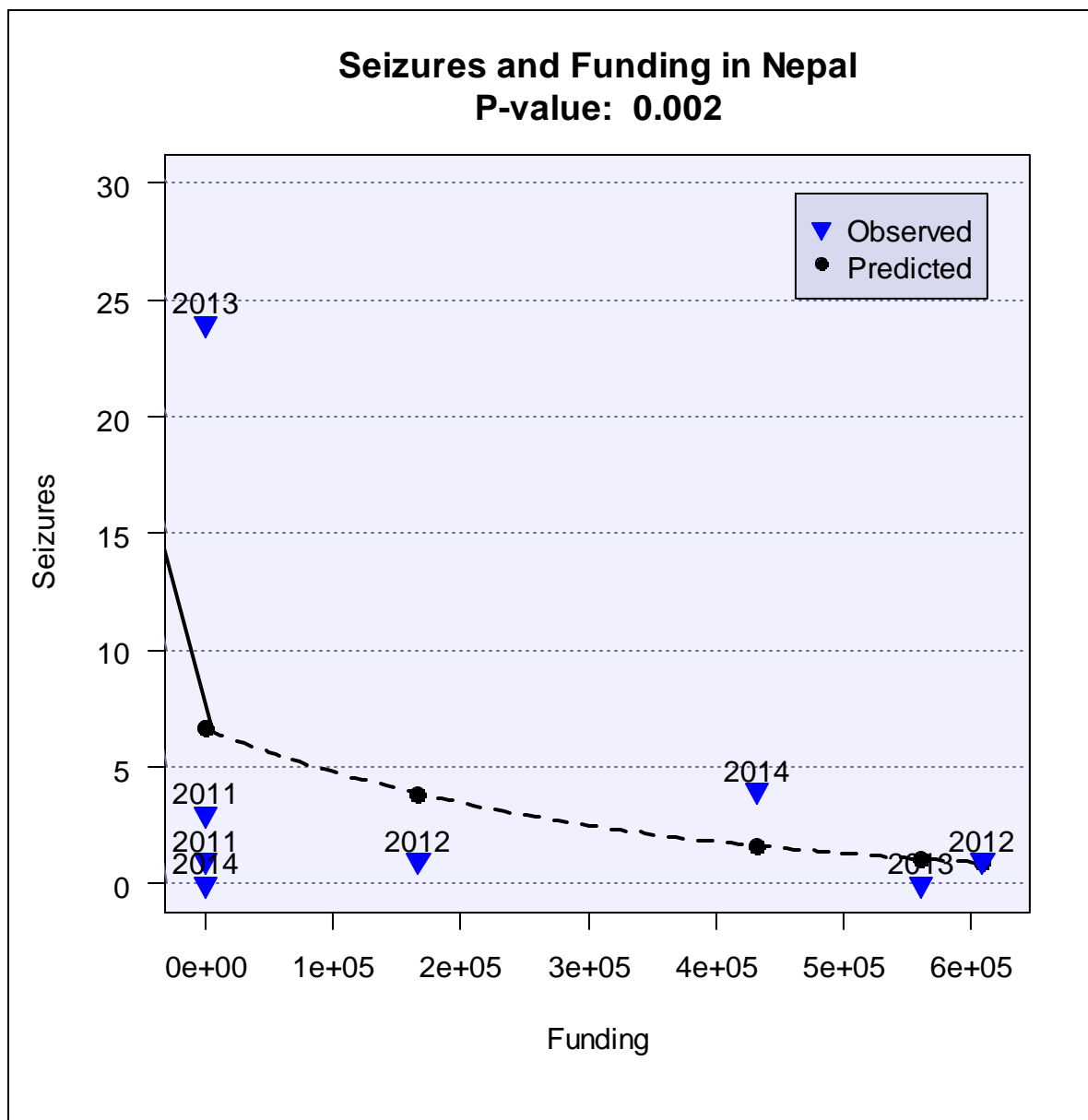


Figure 9: Nepal SRCWP funding and the number of tigers seized.

### *Abundance and Seizures*

In Figure 10, the predicted line shows a possible negative trend between tiger abundance index and the number of tiger seized. The marginally significant p-value indicates that there might be a possible relationship between the two variables in the given model. The model suggests as the tiger abundance index increased, the number of tiger seized decreased. Due to the small dataset, all observations were considered in the final analysis.

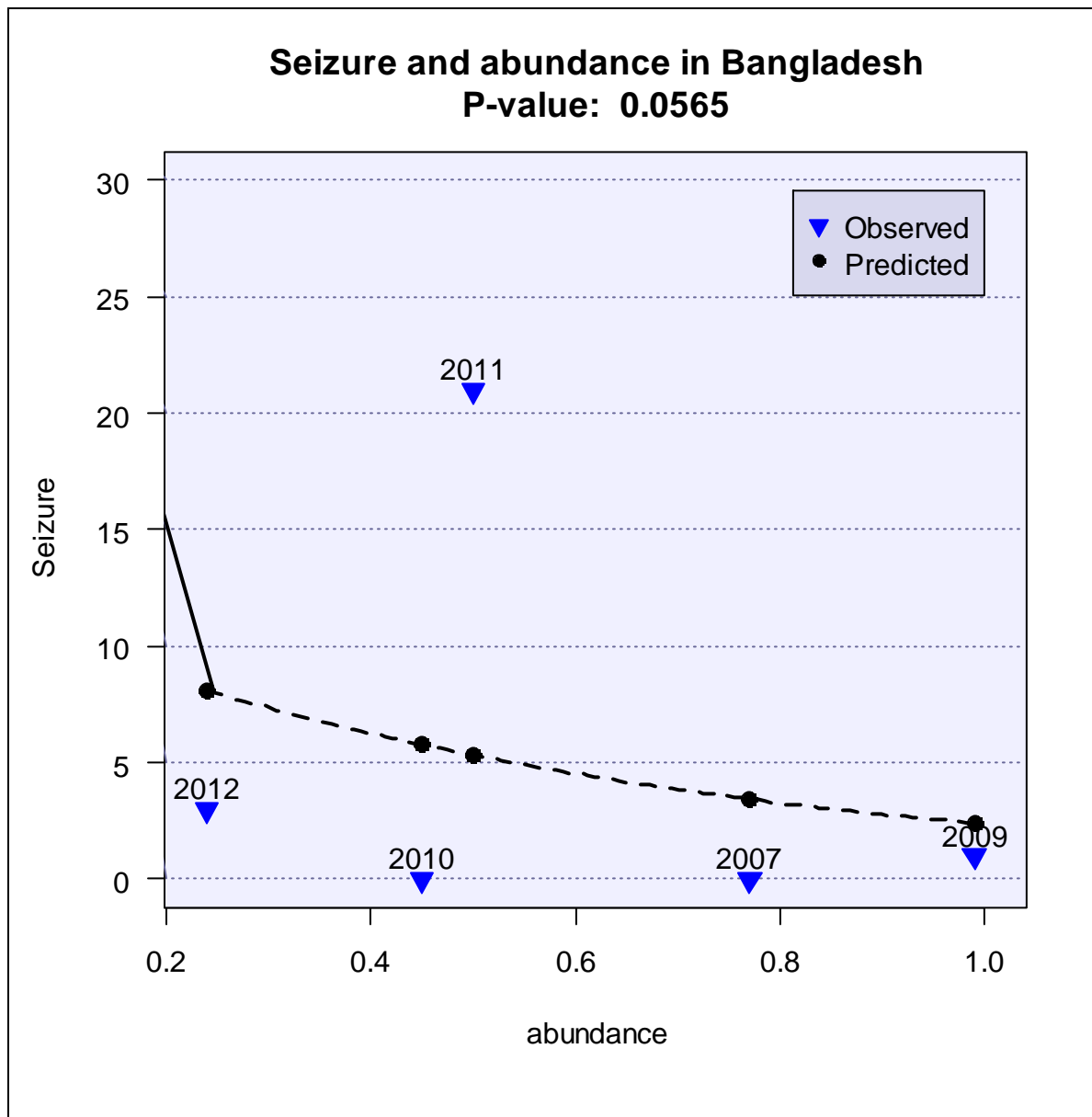


Figure 10: Bangladesh tiger abundance index and the number of tigers seized.

### *Population and Seizures*

In Figure 11, the predicted line shows a possible positive trend between tiger population numbers and the number of tiger seized in Nepal. The low p-value suggests a possible relationship between variables in the given model. The model indicates as tiger population numbers increased, the number of tiger seized also increased. Due to small dataset, all observations were considered in the final analysis.

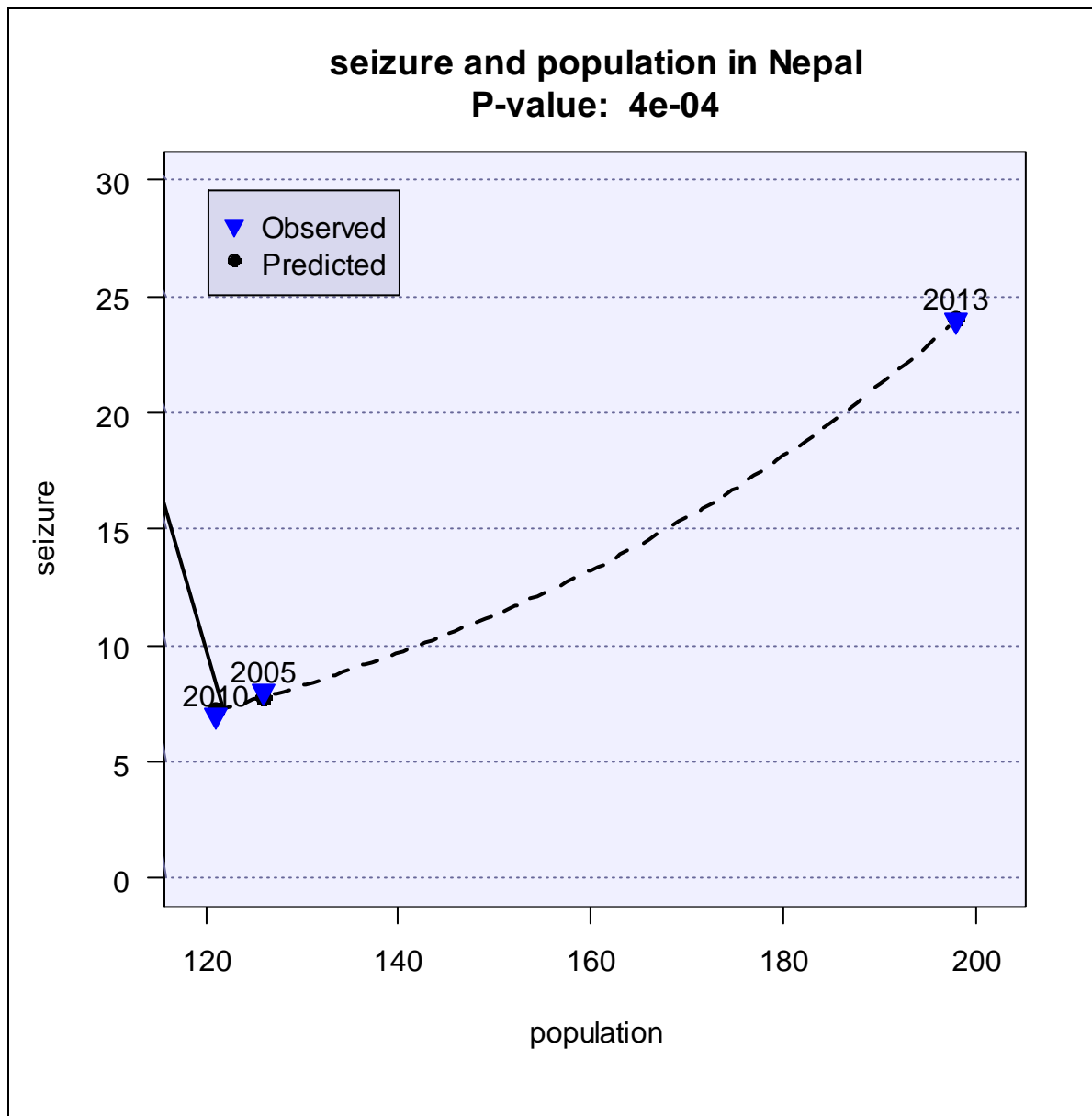


Figure 11: Nepal tiger population numbers and the number of tigers seized.



## **DISCUSSION**

### *Data Interpretation*

The objectives of this study were to evaluate whether the strengthening of law enforcement efforts through additional funding increased tiger seizures and to explore whether legislative, social, and/or leadership factors increased tiger seizures; Bangladesh and Nepal serving as case study countries. One metric for evaluating law enforcement effort is tiger seizures (Stoner and Pervushina, 2013). An increase in funding from Strengthening Regional Cooperation for Wildlife Protection Asia (SRCWP) should result in an increase in the number of tiger seizures. However, as shown in Figures 8 and 9, the data indicate that the opposite is true in both Bangladesh and Nepal. One possible explanation is that SRCWP funding supported anti-trafficking efforts in a broad array of flagship species, not only tigers. In Bangladesh, SRCWP funding supported conservation efforts involving elephants, gharials, langurs, marine turtles, saltwater crocodiles, spoon-billed sandpipers, water birds, and white-rumped vultures (World Bank Group, 2015b). In Nepal, SRCWP funding supported the conservation and protection of elephants, snow leopards, common leopards, one-horned rhinos, pangolins, brown bears, deer, reptiles, seahorses, star tortoises, butterflies, peacocks, hornbills, parrots, parakeets, and birds of prey (NTNC, 2015). SRCWP funding resulted in the seizure of 5,253 wild animals and the arrests of 171 perpetrators in Bangladesh (World Bank Group, 2015b). Likewise,

Nepal experienced an increase in all wildlife seizures. It is evident that flagship species in both countries benefited from SRCWP funding. Since law enforcement efforts were distributed across multiple flagship species, it may have reduced the focus on tiger seizures. Unfortunately, there is insufficient information on SRCWP funding regarding tigers to definitively confirm this explanation.

Another explanation for the negative relationship demonstrated in Figures 7 and 8 is the effect of law enforcement on wildlife crime—effective law enforcement can deter wildlife crime and reduce tiger seizures. Both Bangladesh and Nepal collaborated with multiple international and national crime prevention organizations to control tiger poaching and illegal trade. For example, the Bangladesh Forest Department (BFD) coordinated with the Rapid Action Battalion, Border Guard, Coast Guard, Customs, the Ministry of Foreign Affairs, the Wildlife Trade Monitoring Network (TRAFFIC), United Nations Office of Drugs and Crime (UNODC), and International Criminal Police Organization (INTERPOL) to tackle wildlife crime (World Bank Group, 2015b). Although these partnerships demonstrate an important focus on reducing tiger poaching, there is insufficient information on whether these collaborations led to effective law enforcement.

Ineffective law enforcement efforts could explain why Figure 9 shows a negative relationship between the number of tigers seized and the tiger abundance index in Bangladesh. An increased tiger abundance index should result in a higher number of tigers seized. However, there was insufficient information on how law enforcement was trained, equipped, and managed to definitively conclude this explanation. In fact, a more

likely explanation may include the potential for sampling errors associated with the *khal* survey. The *khal* survey relied on counts of tiger crossings as indicated by pugmarks on the muddy *khal* banks to estimate tiger activity. This may not be the best scientific tiger survey method to accurately assess tiger population trends. In this particular case, science was dictated by the politics of the country, as the *khal* survey was the only assessment method permitted by the Bangladesh government during this time period. There is insufficient information regarding sampling error associated with the *khal* survey to definitively conclude the impact of tiger abundance index on tiger seizures.

Nepal also collaborated with international organizations in its tiger conservation efforts. For example, INTERPOL and the National Central Bureau organized a workshop for Nepal intelligence officers to train them in the use of intelligence, help them manage information in combating environmental crime, and improve environmental law enforcement capacity, with a specific focus on illegal poaching and the illicit trade in tigers. As a result, Nepal shared information through secure INTERPOL channels, used INTERPOL tools and services, and displayed wildlife crime fugitives on the INTERPOL watch list. Additionally, joint wildlife crime operations were conducted between INTERPOL and Nepal law enforcement, such as Operation Prey. This Operation led to the seizure of 40 live tigers and tiger parts, and the arrests of more than a dozen individuals (INTERPOL, 2012; INTERPOL, 2013). Joint operations such as these removed tiger poachers from the landscape, resulting in an increase in tiger populations. This positive relationship between the increase in tiger seizures and tiger population numbers can be seen in Figure 10. After some time, effective law enforcement efforts

may lead to lower tiger seizures as more poachers are arrested. There was not enough data to definitively predict the long-term relationship between tiger seizures and the tiger population numbers in Nepal.

A potential limitation of this study is the small number of observations. Without larger observational data, there was insufficient information to definitively conclude any correlation between variables. However, despite the lack of sufficient information, the analysis of the data available identified some possible interesting relationships, which may provide useful information to conservationists, donor organizations, and law enforcement as they plan future conservation efforts. This analysis merits further research, which can be supported through better recordkeeping of law enforcement's tiger seizures, SRCWP funding, and scientifically accurate tiger surveys.

#### *SRCWP Funding and Project Implementation in Bangladesh and Nepal*

Although there was insufficient information regarding the impact of SRCWP funding, Bangladesh tiger abundance index, and Nepal tiger population numbers on tiger seizures, tiger populations are declining due to wildlife crime and overexploitation (WWF, 2015a). To effectively protect tigers in the wild, tiger protection must increase and law enforcement efforts must be strengthened. The implementation of improved policies can make SRCWP funding more successful at protecting tigers.

It is important to note that all efforts were made during this study to completely understand the details involved in SRCWP funding and project implementation. The World Bank Group, Bangladesh's Ministry of Environment and Forest, Bangladesh Forest Department, Nepal's Ministry of Forests and Soil Conservation, Department of

National Parks and Wildlife Conservation, and the National Trust for Nature Conservation were all contacted in an effort to better understand the motives for fund allocation and project implementation. However, no information was provided by any government agency or the World Bank Group; thus, these SRCWP funding and project implementation policy suggestions were based on the best available information.

The original purpose of the SRCWP was to mitigate all illegal trade and wildlife trafficking in Bangladesh and Nepal (SRCWP Proposal, 2011). While this wider goal is valuable, to improve tiger protection, SRCWP funding must focus solely on tigers. This includes increasing law enforcement efforts to control tiger poaching and illegal trade, better patrolling of protected areas by law enforcement, and more community involvement regarding tiger poaching. Additionally, tracking of SRCWP funding dedicated to all flagship species would be useful. Better tracking would allow a comprehensive understanding of how funding relates to conservation efforts and would provide transparency to donor organizations on project evaluation and effectiveness. Therefore, two central suggested policies for more effective tiger protection include targeted funding for tiger protection activities and the tracking of funding for all flagship species.

Bangladesh and Nepal's government agencies manage their SRCWP funding and project differently. In Bangladesh, the Ministry of Environment and Forest (MOEF) and the Bangladesh Forest Department (BFD) directly receive SRCWP funding from the World Bank Group. The project administration, implementation, and coordination are performed within MOEF and BFD (World Bank Group, 2015b). However, in Nepal, each

government agency has clearly defined roles and responsibilities. The Minister of Forests and Soil Conservation (MOFSC) directly receives the funding from the World Bank Group and controls all decision making for the project as the executor. The Department of National Parks and Wildlife Conservation (DNPWC) implements and completes the funded project. The National Trust for Nature Conservation (NTNC), an autonomous non-profit organization, coordinates and directs manpower to the project (NTNC, 2015). There are advantages to Nepal's system of clearly defined roles and responsibilities. This includes more effective and efficient use of financial resources and overlap reduction in conservation efforts. Furthermore, most non-governmental organizations (NGOs) like NTNC work on a local level and are knowledgeable about local community issues and concerns. These organizations can serve as intermediaries to better translate national policy into local action. Therefore, it is suggested that both countries implement policies that clearly define the roles and responsibilities of government agencies and that include the utilization of local NGOs.

Policies to improve tiger protection might also consider more funding transparency. SRCWP funding and project implementation has supported the creation of a Wildlife Crime Control Unit (WCCU) in Bangladesh and a Wildlife Crime Control Bureau (WCCB) in Nepal. The purposes of WCCU/WCCB are to equip law enforcement with a forensics lab, create a legal support arm, establish a wildlife crime control group, and develop a wildlife crime database. Additionally, SRCWP funding supports the creation of a Wildlife Center in Bangladesh, which is intended to facilitate research, education, and communication regarding wildlife crime (World Bank Group, 2015b).

Even though the cost and financing might vary depending on capacity of many range countries, the creation of WCCU/WCCBs and Wildlife Centers may have a broad appeal. Therefore, a policy suggestion is to increase the transparency regarding the cost and financing for these structures so that other range countries may have the necessary information to consider similar solutions.

A scientifically accurate tiger population trends might also be beneficial policy suggestion. Historically, Bangladesh and Nepal depended on pugmark techniques to estimate tiger population trends; however, this technique was proven to cause highly erroneous data (Karanth, 2011). Since 2010, Nepal used camera-trapping techniques extensively in estimating tigers and their prey (M. Shrestha, personal communication, March 31, 2015). In Bangladesh, the last known tiger estimate was in 2004 and it used the pugmark technique. Since that time, Bangladesh research employed a *khal* technique, the limitations of which are discussed in this study. Presently, SRCWP funding supports the camera trapping tiger census in Bangladesh (World Bank Group, 2015b). It is suggested the policies allowing for scientifically accurate and reliable tiger censuses be implemented, as this will help conservationists and scientists establish a true tiger population estimate against which to compare future trends.

Therefore, based on the best available information, there are a total of six policy suggestions to enhance the effects of SRCWP funding and project implementation on tiger conservation. These policy suggestions include the following 1) focus funding specifically on tiger protection; 2) track funding for all flagship species; 3) establish clearly defined roles and responsibilities for government agencies involved in managing

the funding and project; 4) use NGOs as intermediaries between national and local levels; 5) increase transparency regarding the cost and financing of wildlife crime structures; and 6) conduct scientifically accurate tiger surveys. The implementation of these suggested policies may increase the effectiveness and efficiency of SRCWP funding and project implementation. These improvements can lead to better conservation efforts necessary to increase tiger populations and reduce wildlife crime.

#### *National Wildlife Legislation Impacting Tiger Protection*

Another component affecting tiger protection and law enforcement efforts is national wildlife legislation in Bangladesh and Nepal. National wildlife legislation empowers law enforcement to protect wildlife, arrest perpetrators, and confiscate wildlife products when a crime is committed. Potential weaknesses in the legislation can weaken wildlife protection by reducing the effectiveness in law enforcement efforts. The national wildlife legislation in Bangladesh is the Wildlife (Conservation and Security) Act of 2012, while the National Parks and Wildlife Conservation Act of 1973 governs the national wildlife legislation in Nepal. The potential concerns and weaknesses discussed herein are drawn from English translations of the legislation; it is important to note that the original Bangla and Nepalese versions of the national wildlife legislations may address some of the issues mentioned.

In Bangladesh, the Wildlife (Conservation and Security) Act of 2012 provides law enforcement with extensive powers to confiscate items involved in the commission of a wildlife crime; however, the power to search and seize vehicles, vessels, and/or aircrafts is not included in the Act. The authority to search and seize is particularly important



because tigers and tiger parts are often transported via vehicles, vessels, and/or aircrafts through Bangladesh. Without the ability to search and seize vehicles, vessels, and/or aircrafts, Bangladesh law enforcement can be rendered ineffective. To remedy this, a policy that gives law enforcement the power to search and seize vehicles, vessels, and/or aircrafts is suggested.

The Wildlife (Conservation and Security) Act of 2012 also determines how wildlife is imported and exported into Bangladesh. The penalty for violating import and export regulations has a maximum sentence of one (1) year, a fine of 50,000 Taka (Bangladesh currency, equivalent to 642.67 U.S. Dollar (USD)), or both. As tigers and tiger parts have an estimated retail value of 50,000 USD (Challender and MacMillian, 2013), the sentences and fines are inadequate compared to the profit made from illegally transporting tigers and their parts. Therefore, it is suggested that a policy be instituted to impose stricter sentences and higher fines against offenders.

Conversely, Nepal's legislation protecting wildlife appears to be strong—it gives law enforcement the powers needed to reduce wildlife crime and it imposes appropriate penalties upon those who commit wildlife crimes. In Nepal, the National Parks and Wildlife Conservation Act of 1973 gives law enforcement extensive powers to inspect and search vehicles and confiscate items involved in the commission of a wildlife crime. Law enforcement is also permitted to exercise these powers without obtaining a warrant or consent of the individual. Importation and exportation of trophies and wildlife can only be done with the written permission of the Ministry of Forests and Soil Conservation, and under the National Parks and Wildlife Conservation Act, illegally transporting a tiger

carries a maximum sentence of fifteen (15) years, a fine of 100,000 Rupees (Nepali currency, equivalent to 982.90 USD), or both.

Despite the strong wildlife legislation, human-tiger conflict is a major problem in Nepal. The National Parks and Wildlife Conservation Act of 1973 created Department of National Parks and Wildlife Conservation (DNPWC), which established a system that categorizes tigers that kill humans as either one-time killers or serial killers. Serial killers are exterminated immediately, while one-time killers are captured and released into deep forest (Gurung et al., 2008). Without the use of radio-collars, the difference between one-time killer and serial killer can be difficult to determine. As a result, the chances of erroneously exterminating one-time killers or releasing serial killers back into the forest increases. More importantly, human deaths caused by tigers in Chitwan National Park increased significantly from 1.2 per year in 1998 to 7.2 per year in 2006 (Gurung et al., 2008). Gurung et al. (2008) suggested local villagers be recruited to help radio collar tigers, monitor potentially dangerous tigers, and participate in long-term tiger conservation awareness programs focused on tiger behavior. Therefore, it is recommended as a policy suggestion that DNPWC abandon the ineffective tiger categorization system, and implement the suggestions of Gurung et al. (2008) to mitigate human-tiger conflict.

National wildlife legislation is an integral part of tiger protection and effective law enforcement, and the policy suggestions made here provide an opportunity to reduce the weaknesses in the legislation. In Bangladesh, policy suggestions were made to provide law enforcement with the power to perform search and seizure of vehicles,

vessels, and/or aircrafts, and to impose stricter sentences and higher fines for violators. In Nepal, the primary policy suggestion is for the DNPWC to follow the suggestions of Gurung et al. (2008) to mitigate human-tiger conflict, instead of relying on its current tiger categorization system. Closing the loopholes in Wildlife (Conservation and Security) Act of 2012 in Bangladesh and implementing better policies to address human-tiger conflict in Nepal can improve tiger protection and strengthen law enforcement efforts in both countries.

#### *National Wildlife Legislation Impacting Other Wildlife Protection*

National wildlife legislation can also have an indirect impact on tiger conservation and law enforcement efforts, in addition to the direct effects discussed above. Potential loopholes or weaknesses in national wildlife legislation can reduce prey density, increase exploitation of wildlife, and mitigate conservation efforts, which are linked to tigers' survival in the wild. In order to increase tiger protection and strengthen law enforcement efforts, these types of potential loopholes must be addressed.

In Bangladesh, the Wildlife (Conservation and Security) Act of 2012 does not address obstructions or bribes of wildlife law enforcement officers, which poses a serious problem in the effectiveness of law enforcement officers. They can be bribed to ignore hunting, poaching, and illegal trade of wildlife. Additionally, the Act does not address forgeries of hunting licenses/applications and fraudulent trophy identification markers. This weakness has the potential to increase the hunting of wildlife that serve as prey for tigers, particularly deer. Tiger density is directly related to prey abundance (Karanth et al., 2004; Miquelle et al., 2005), and UNODC (2013) reported that rampant deer hunting

occurs in the Sunderbans. Therefore it is suggested the policies be put in place to address obstructions or bribes of wildlife law enforcement officers, as well as forgeries of hunting licenses/applications and fraudulent trophy identification markers.

In Bangladesh, the Wildlife (Conservation and Security) Act of 2012 protects species that are indigenous to Bangladesh or found in nearby Southeast Asian countries. Under the Act, *Elephas Maximus* (the Asian elephant) is protected, while the *Loxodonta Africana* (the African elephant), which suffers from ivory trade, is not protected. Additionally, snow leopards, which are found in Nepal, do not appear to be listed in the Act. These types of exclusions make the exploitation of wildlife easier and create situations in which law enforcement is unable to respond to illegal trade and wildlife trafficking. Therefore, a policy to protect all domestic and foreign species in Bangladesh equally is suggested.

In Nepal, the DNPWC is the leading government agency that addresses the protection of national parks, wildlife reserves, and wildlife; however, the National Parks and Wildlife Conservation Act of 1973 did not address financing for the DNPWC. At any given time, several higher-level DNPWC posts are vacant. Additionally, 70 percent of the DNPWC's budget goes to the Nepal Army for patrolling and monitoring protected areas (Heinen and Kattel, 1992). As a result of financial constraints, wildlife protection efforts and conservation activities are reduced. Heinen and Kattel (1992) suggested that foreign aid be used to fill staff positions and finance conservation efforts. Therefore, policy suggestions may include a slight reduction in Nepal Army's budget and the use of foreign aid as proposed by Heinen and Kattel (1992) to alleviate financial constraints.

In general, protection of wildlife and conservation activities can have significant impacts on tiger conservation and law enforcement efforts. In Bangladesh, policy suggestions were made to address loopholes to current national legislation. This includes bribes of law enforcement officials, forgeries of hunting licenses/applications and fraudulent trophy identification markers, and the need for equal protection for all domestic and foreign species. In Nepal, policy suggestions include adjusting the distribution of DNPWC's budget and using foreign aid to address the department's financial constraints as suggested by Heinen and Kattel (1992). Addressing these potential loopholes in Bangladesh and Nepal's national legislation can improve wildlife protection, which can lead to increased law enforcement and conservation efforts.

*Integration of the Convention on International Trade in Endangered Species of Wild Fauna and Flora into National Wildlife Legislation*

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is the first line of defense against international illegal trade of all endangered species. Bangladesh and Nepal are signatory countries to CITES, Bangladesh in 1982 and Nepal in 1975 (CITES, 2015). More importantly, it is the integration of CITES into national wildlife legislation that determines a country's effectiveness in controlling international illegal trade in flora and fauna. Therefore, any potential loopholes in the integration of CITES into national wildlife legislation may pose serious threats to wildlife protection, as well as weaken law enforcement efforts.

In Bangladesh, the Wildlife (Conservation and Security) Act of 2012 does not address or reference the CITES Appendices. CITES Appendix I listed species are most

threatened with extinction due to trade. CITES prohibits international trade in these species, but trade can occur for non-commercial purposes. CITES Appendix II listed species are not necessarily threatened with extinction, but may become so if trade is not controlled. CITES Appendix III listed species are threatened with extinction in at least one country and require the cooperation of other countries to prevent exploitation (CITES, 2015). By not referencing the CITES Appendices, Bangladesh is ineffective in regulating the trade in all flora and fauna not indigenous to its own country. Tigers are listed as CITES Appendix I species and enforcement of CITES is vital to wild tiger survival. Therefore, a suggested policy is to include all current CITES Appendices in the Act.

In addition, the Wildlife (Conservation and Security) Act of 2012 only refers to CITES certificates, not permits. Under CITES, trade in Appendix listed species can only be accomplished with the issuance of import permits, export permits, and re-export certificates. Re-export occurs when the export of any specimen that has previously been imported; a re-export certificate is issued in this case. CITES Appendix I listed species require both import and export permits; CITES Appendix II listed species require an export permit or a re-export certificate; and CITES Appendix III listed species require appropriate permits or certificate (CITES, 2015). By not addressing permits, there is no guidance in the Act for people engaged in trade of species listed in CITES Appendices I and II. This failure to address permits and provide guidance has the potential to increase illegal trade and trafficking in wildlife and wildlife products. Additionally, penalties for violating re-exports are not addressed in the Act, which may render law enforcement

ineffective in controlling trade in wildlife. Therefore, policy suggestions include guidance for import and export permits, and establish penalties for re-exports violations.

In Nepal, the National Parks and Wildlife Conservation Act of 1973, Nepal Treaty Act of 1991, the Forest Act of 1995, and the Biodiversity Strategy of 2002 provide similar wildlife protection as CITES. However, CITES is not specifically addressed in any Nepali national wildlife legislation (Aryal, 2004). Currently, Nepal is developing a procedure that integrates CITES into their national wildlife legislation. This procedure has a three-prong approach: 1) preparation of appropriate and supportive legislation for CITES compliance; 2) establishment of a National CITES Secretariat that will coordinate and have oversight over other government agencies; and 3) development of analytical and operational protocol to meet CITES requirements (NTNC, 2015). Therefore, a policy suggestion for Nepal is to fully integrate CITES details, scope, and its own national obligations into the national wildlife legislation.

CITES is a vital part in controlling international illegal trade, which can have a direct impact on tiger protection and law enforcement efforts. To improve CITES compliance in Bangladesh, a policy suggestion is to update the Wildlife (Conservation and Security) Act of 2012 to address CITES appendices, CITES permits, and penalties for re-export violations. For Nepal, a policy suggestion is to fully integrate all aspects of CITES into the national wildlife legislation. By better integrating CITES into national wildlife legislation, Bangladesh and Nepal can improve protection of all flora and fauna, and related law enforcement efforts.

*Social and Leadership Components*

Local communities are an important part of conservation. These local communities have the least in terms of material or economic assets, but they have the largest responsibility in local biodiversity conservation. When local communities are made aware of biodiversity and have a stake in conservation, they are more inclined to take actions that protect wildlife, such as reporting potential poachers. In both Bangladesh and Nepal, non-governmental organizations (NGOs) and national legislation have empowered local communities to become stakeholders in tiger protection efforts.

In Bangladesh, approximately 1.7 million people live around the Sunderbans. They depend on food, firewood, and livestock fodder from the Sunderbans (GTF, 2011). Tigers in the Sunderbans suffer from direct actions, such as stray tiger killings, and indirect actions, such as prey poaching and consumption. To help reduce these threats, WildTeam, a NGO working in Bangladesh, has instituted two successful community outreach programs for tiger protection. The first community tiger protection program established Village Tiger Response Teams (VTRTs), which aim to mitigate human-tiger conflict, empower local communities to secure their villages against tiger-attacks, and strengthen the relationship between local government and community. Today, there are over 20 VTRTs around the Sunderbans. Additionally, each VTRT established human-tiger conflict guidelines. Since 2012, there was a 100 percent reduction in stray tiger killings and an 85 percent reduction in human deaths caused by tigers. The second community tiger protection program educated the local community in the Sunderbans. The purpose of the program was to change social attitudes by attaching social disapproval to the act of killing tigers or their prey. Teachers, journalists, religious leaders, local



politicians, and village men, women, and children were targeted in this program. The program reached more than 200,000 people by strategically placing 208 billboards in high traffic places around the Sunderbans, like schools and businesses (M. Nagendran, personal communication, March 31, 2015; USFWS, 2012).

In Nepal, approximately 6.7 million people live around the Terai, and they depend on the Terai for natural resources like food, firewood, and livestock fodder (GTF, 2011). The Buffer Zone Regulation of 1996 and the Buffer Zone Guidelines of 1999 gave extensive power to the local communities in protected areas by helping them develop socioeconomically and manage natural resources. Local communities share 30–50 percent of the income from eco-tourism and sales from forest products. As a result of these programs, forests and wildlife are protected, poverty is reduced, and traditional livelihoods are preserved in protected areas (Paudel et al., 2007). Additionally, these programs evolved into wildlife monitoring programs by the local community. Today, there are more than 400 civilian units patrolling corridors and protected areas in the Terai (WWF, 2015b). These civilian units also provide vital intelligence on potential poachers and biodiversity threats to law enforcement. Furthermore, Nepal wildlife law enforcement efforts involve the Nepalese Army, which patrols and monitors protected areas and corridors and there is a general in the Nepal Army who works solely to enhance wildlife protection (National Geographic, 2014). Local community involvement, Nepalese Army commitment, and law enforcement efforts have been effective in controlling tiger poaching in Nepal.

Commitment is also important part of tiger conservation. In Bangladesh, WildTeam initiated some innovative programs like the VTRTs and educational campaigns for tiger protection. The outcomes of these programs lead to better conservation practices at a local level; however, more should be done on the national level involving government leadership and law enforcement using technology like unmanned aerial vehicles (UAVs) and spatial monitoring and reporting tools (SMART). As it stands, the commitment to conservation is clear in Bangladesh NGOs and the local communities they partner with, but it is not obvious at the government and national levels. A higher level of government commitment could improve tiger protection and strengthen law enforcement efforts in Bangladesh.

In Nepal, the situation is more positive—commitment to conservation occurs at all levels of the government and involves local communities. Early legislation focused on creating protected areas and preserving wildlife. This has evolved into a more holistic approach that incorporates the participation of local communities and people (Heinen and Kattel, 1992). In 2008, Nepal’s government gave 28 percent of the country’s land to local communities to manage, which led to strong community-based protection for protected areas and wildlife. Large NGOs like the World Wildlife Fund (WWF) sponsored educational programs called Eco-Clubs in local public schools. Today, more than 500 Eco-Clubs have been established in Nepal, with nearly 80,000 children introduced to conservation issues. Additionally, the prime minister of Nepal is the chair of the National Tiger Conservation Committee, and the Minister of Forests and Soil Conservation is the chair of the Wildlife Crime Control Coordination Committee. Both government officials

took leadership positions in conservation, which demonstrates the commitment of the government. Nepal's government has also signed numerous international treaties with China and India to prevent illegal trade and wildlife trafficking. Furthermore, the wildlife law enforcement utilizes UAVs to improve anti-poaching operations and has embraced SMART technology to improve conservation management (WWF, 2015b). Commitment to conservation across the country involves local communities, law enforcement, and government officials, and as a result, Nepal achieved two years of zero poaching.

Local community involvement and commitment to conservation can be a powerful force in preserving biodiversity. NGOs and national legislation in Bangladesh and Nepal have facilitated local leadership in tiger protection, which translated into higher local commitment. However, in order to have effective tiger protection and law enforcement, commitment to conservation must occur on all levels of government.

## **CONCLUSION**

Wildlife crime is a serious threat to tiger protection and conservation, and the demand for wild tigers and their parts continues to increase in many countries. The objectives of this study were to test whether strengthening law enforcement efforts through additional funding increased tiger seizures and to explore whether legislative, social, and/or leadership factors increased tiger seizures. The analysis did not show strong relationships between Strengthening Regional Cooperation for Wildlife Protection Asia (SRCWP) funding, Bangladesh tiger abundance index, and Nepal tiger population numbers on tiger seizures; however, this was largely due to insufficient information and data regarding tiger seizures, SRCWP funding, and tiger surveys. This study's results merit further research and better recordkeeping of tiger seizures, SRCWP funding and project implementation, and scientifically accurate tiger surveys in both countries examined. These measures can provide conservationists, donor organizations, and law enforcement with the knowledge and means to better protect wild tigers.

The broader goal of this study is to suggest practices and policies that can help prevent tiger decline due to wildlife crime. In both Bangladesh and Nepal, tiger protection requires accurate and complete tiger data, effective use of SRCWP funding and project implementation, better governance, and increased leadership. Attaining accurate and complete tiger data involves extensive information on tiger seizures, funding for tiger protecti

on, and scientifically accurate tiger surveys. SRCWP funding and project implementation can be made more effective through better management and transparency. Better governance includes addressing potential weaknesses and loopholes in national wildlife legislation, integrating Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) effectively into national wildlife legislation, and improving CITES compliance. Increased leadership involves the participation and commitment of local communities, non-government organizations (NGOs), and government in tiger conservation efforts and initiatives. All of these factors have the potential to improve tiger protection, strengthen law enforcement efforts, increase conservation activities, and reduce wildlife crime .

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