Wildlife Enforcement Monitoring System (WEMS)

Implementation Handbook

Volume 1
### Authors

**Remi Chandran**

Remi Chandran is a PhD researcher at University of Twente and his research work relates to public policy and governance with regard to enforcement and compliance of CITES convention. Before joining Twente he was Senior Researcher at UNU-IIST Center for Electronic Governance and architect of Wildlife Enforcement Monitoring System (WEMS) initiative. He has more than 13 years of experience, working with Governments and United Nations organizations in the area of environmental governance issues and has managed several national and international development projects. Mr. Chandran is also a recipient of the Erasmus Mundus Scholarship, The Irish Government (ICOS) fellowship and was also nominated for the CIBA GIHY award. His work on the WEMS initiative has been quoted by several media including Reuters, Kyodo news and Japan Times.

**Adegboyega Ojo**

Adegboyega Ojo is a Research Fellow at the United Nations University - International Institute for Software Technology (UNU-IIST) located in Macao. At UNU-IIST, he belongs to the Center for Electronic Governance. Before joining UNU-IIST in May 2004 as a Postdoctoral Fellow, he was Senior Lecturer at the Department of Computer Sciences, Faculty of Science of the University of Lagos in Nigeria. His interest is primarily in the domains of Electronic Governance, Technology strategy and architectures, and Software Technology. His academic and professional career spans 19 years of teaching, research, training and capacity building in computing, e-governance and related subjects and a total of 22 years of software development experience. He has published several peer-reviewed papers as journal articles, book chapters, and contributions to conference proceedings. Adegboyega Ojo holds a PhD degree in Computer Science from the University of Lagos in Nigeria (1998) and a Bachelor degree from the same university (1991). He is also a professional member of the Association for Computing Machinery and the Computer Professional Association of Nigeria.

**Jean Pierre**

Jean-Pierre Auffret is the co-founder and director of the Center for Advanced Technology Strategy, and co-founder and vice president of the International Academy of CIO. He is a recent director of the M.S. in Technology Management Program at George Mason University and has been a member of the business school faculty at Mason, the University of Maryland and American University; public policy faculty at Duke University and physicist-in-residence at American University. He has 25 years of technology industry and academic experience, including management and executive positions, with MCI and its joint venture with British Telecom, Concert. J.P. earned a B.S. degree from Duke University, an M.B.A. from the University of Virginia and a Ph.D. in Physics from American University.

**Ng. Chong**

Ng Chong is founder and director of Campus Computing Centre (C3) at United Nations University where he leads a dynamic team of engineers and joins forces with his team to enable business change, advance the distributed university infrastructure based on the concept of a Global Office (one desktop everywhere you go). Prior to focusing on the directorship and operations of the ICT infrastructure, he established the Media and Technology Laboratory at United Nations University to advance the vision and concepts of a global Virtual University and develop cutting-edge learning technologies, including an award-winning video centered discussion tool. Before joining United Nations University, he was a lecturer at Florida State University, and previous to that, he held several ICT management and senior consulting positions in the US and Latin America. Dr. Chong received graduate degrees from the University of Tokyo in Engineering (Ph.D.) and from the University of New Mexico in Computer Science (MS). His research interests are in global information system architectures, fault tolerant computing, information security and applied computing in learning.

**Khoi Nguyen**

Khoi Nguyen is the Software Engineer of WEMS project and also works for IFI solutions Vietnam and is involved in the implementation of Semantic Interoperability Middleware, design and developing IT strategic plan and alignment software for public organizations. Previously, he was a Researcher at the United Nations University -International Institute of Software Technology and has also worked for the Arles research project at French National Institute for Research in Computer Science and Automatic Control (INRIA). Mr. Nguyen holds a Master degree in Computer Science (2000) from The Francophsone Institute for Computer Science, Hanoi, Vietnam and a B.Tech in Computer Science from Hanoi University of Technology, Hanoi, Vietnam.
ABOUT THIS DOCUMENT

The Wildlife Enforcement Monitoring System Implementation handbook details the important considerations to be made for effective national implementation of the WEMS project. This handbook outlines the basic steps to be taken toward its implementation and can be used as guide for WEMS implementation in various countries.

The WEMS handbook was prepared prior to the implementation process and will undergo further revision based on the experience of its first pilot implementation in Africa and on any update with regard to the products delivered through the project. This handbook should be used only as a reference material and national agencies should make sure to build upon the existing framework detailed in this handbook. We believe, this will be the first step to bring out national level guides for implementation of the WEMS project with local language versions.

ACKNOWLEDGEMENT

We thank the sincere commitment and dedication of all reviewers of this handbook and for providing their valuable comments into the document.

Special thanks to Mr. John Sellar, Chief of enforcement unit at the CITES secretariat and Ms. Elizabeth Mrema, Executive Secretary of CMS convention and former chief of Division of Environmental Law and Convention, United Nations Environmental Programme (UNEP) for their continued advice and sharing their thoughts and experience in the context of law enforcement.

Mr. A.N. Prasad (IGF, Ministry of Environment and Forests, Government of India), Mr. P.R. Sinha (Director, Wildlife Institute of India) and Ms. Rina Mitra (Additional Director of Wildlife Crime Control Bureau (WCCB)) for providing all advice on country implementation process.

Prof. Padmanabhan Krishnan, (Bond University, Australia) for his excellent thoughts on IT security and secure document transfer.

Mr. Peter Eredics and Dr. Michael Gould of ESRI Corporation for providing the technical support and advice on Geo-spatial integration into the WEMS model.

Dr. Marc Levy, Associate Director of CIESIN at Earth Institute, Columbia university and his team for their commitment in defining indicators on wildlife crime assessment.

International Fund for Animal Welfare (IFAW) for financially supporting the WEMS initiative.

Finally, we extend our sincere thanks to friends and colleagues at United Nations University Headquarters, Tokyo; UNU-IIST-Macao and special thanks to our fellow mates, Mr. Jean Soupkodjou (Researcher), Mr. Vincent Douwe (researcher) and Mr. Njei Check (Senior Project Officer of National Agency for Information and Communication Technologies (ANTIC), Cameroon).
# TABLE OF CONTENTS

Chapter 1: ................................................................................................................. 4
Introduction: ....................................................................................................... 4
1.2 Previous works ......................................................................................... 5
1.3 WEMS as a compliance model .......................................................... 6

Chapter 2 .............................................................................................................. 7
Conceptual framework of WEMS .................................................................... 7
2.1 Livelihood and Poverty ........................................................................... 7
2.2 Markets and Prices .................................................................................. 7
2.3 Laws and Regulation ............................................................................... 8
2.4 Resource Management ........................................................................... 8
2.5 Awareness ................................................................................................. 8
2.6 Geographical proximity ......................................................................... 8

Chapter 3: ............................................................................................................ 9
Implementation of WEMS ................................................................................ 9
3.1 Three levels of Action ............................................................................. 9
3.1.1 Global Level ....................................................................................... 9
3.1.2 National Level .................................................................................. 9
3.1.3 State level ......................................................................................... 10
3.3 Data collection, Analysis and Verification .......................................... 11
3.3.1 The protocol for information sharing ............................................. 11
3.4 WEMS Software .................................................................................... 12
3.5 Important points to note while entering data ...................................... 13
3.6 Analysis of the data ................................................................................. 14

Chapter 4: ............................................................................................................ 17
Framework for inter-agency cooperation .................................................... 17
4.1 Survey ....................................................................................................... 17
4.1.1 National Level Survey ...................................................................... 17
4.1.2 State level survey ............................................................................. 17
4.2 Gap Analysis ............................................................................................ 17
4.3 Recommendation ..................................................................................... 17
4.4 Training .................................................................................................... 17
4.5 Research .................................................................................................. 18
4.6 Dissemination .......................................................................................... 18

Chapter 5: ............................................................................................................ 19
Management ..................................................................................................... 19
5.1.1 Global Project management Office (GPMO) ................................ 19
5.1.2 National Project Management Office (NPMO) ............................ 19
5.2 Inputs ....................................................................................................... 20
5.3 Outputs ..................................................................................................... 20
5.4 Process ..................................................................................................... 20
5.5 Monitoring and Control ......................................................................... 20
5.6 Staffing ..................................................................................................... 21
5.7 Budgeting ................................................................................................ 22
5.8 Measuring Governance ......................................................................... 22
5.9 Risk Assessment ...................................................................................... 22

Chapter 6: ............................................................................................................ 23
Conclusion ......................................................................................................... 23
Table of Figures

Figure: 1 Flow of information in the WEMS model.................................................................11
Figure: 2 WEMS Software.........................................................................................................13
Figure: 3 WEMS – Simulation model – Tracking Analyst.........................................................15
Figure: 4 WEMS – Seizure Map...............................................................................................16
Figure: 5 WEMS – Data Clock .................................................................................................16
CHAPTER 1

INTRODUCTION:

The continued development, capability and promise of information technology provides an avenue for enhancing the effectiveness of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). One area in particular where ICT can contribute to CITES success is in the timely national, regional and global collection and analysis of data on illegal trade of endangered species. Such data and analysis will help to inform local, national and international enforcement efforts and enhance CITES policy analysis and decision making.

Greater use of ICT to support CITES will also contribute to national CITES compliance efforts. One of the biggest challenges to CITES and other multilateral environmental agreements is the limited availability of country data especially with regard to illegal trade and enforcement for reporting and compliance purposes.

The purpose of this manual is to highlight the potential benefit and importance of Wildlife Enforcement Monitoring System (WEMS) as a tool in bringing together national and local public sector agencies through a common information sharing platform, thereby providing a means to support national enforcement efforts and compliance. Through several years of research it was found that by integrating national efforts regionally and globally, WEMS can also act as a tool to provide timely analysis and policy development, with the goal of identifying risks early and developing corresponding action plans and thereby being a solution for monitoring compliance to CITES and related multilateral agreement.

Hence, Wildlife Enforcement Monitoring System (WEMS) can be defined as an environmental governance model and system with its goal to:

- Provide timely national data and analysis on illegal trade of endangered species.
- Support national CITES enforcement and compliance efforts
- Provide a platform for regional and global exchange and analysis of illegal trade of endangered species and contribute to CITES international enforcement efforts and policy consideration.

One of the major features of WEMS is that, it has been developed in line with the recommendations outlined in Agenda 21 of United Nations Conference on Environment and Development, which advises on the development of international information networks linking national, sub-regional and international systems.

WEMS collaboration will act as a support system for national and local governments, industry, universities and the United Nations in addressing the issue of compliance and enforcement and in foreseeing the sustainability of WEMS system.

The WEMS system also quantifies data collected from the grass root level and from local enforcement agencies, compiling it to a central repository at the national level. This information is then researched analyzed and transferred to various international agencies electronically, the most important being the standard ecomessage administered by Interpol.

WEMS will also act as a regional framework for enhancing cooperation between policy

---

1 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) [http://www.cites.org](http://www.cites.org)
makers, researchers and the enforcement community on wildlife crime data analysis and joint capacity-building. It will then automatically ensure the effective participation of developing countries as well as countries with economies in transition within a specific region thereby facilitating active communication concerning CITES convention. This uniform framework will also ensure transparency and accountability built through a participatory approach as outlined in the UNEP Bali strategic action.

1.1 BACKGROUND

WEMS was developed by United Nations University in partnership with Asian Conservation Alliance to address the issue of information collection and analysis of wildlife crime. WEMS was envisioned as a means to address the concerns raised by the international community during the CITES Conference of Parties meeting held in Bangkok in 2004 which identified the need for and benefit of greater and more timely sharing of information between enforcement communities and the respective CITES management authorities.

The importance of WEMS project was first brought to the attention of the international community during a meeting in Tokyo (Kyodo News, 2006) where the prototype of the model was displayed. Prior to that it was presented to INTERPOL during the Wildlife working group meeting in Beijing and the national enforcement communities during the CITES enforcement officers meeting in Kunming, China. At the CITES CoP14 meeting in Hague, in 2007, WEMS was showcased as possible model which could be used as a national database for collecting, compiling and sharing of information.

With this background, the Government of India expressed an interest to adopt WEMS to enhance their CITES efforts.

Despite its potential as an information sharing and analysis tool, the CITES enforcement expert group in July 2009 recognized that it is important to test the tool operationally before it is endorsed by the group.

Hence the results of a country implementation will be the key in global acceptance of WEMS initiative.

1.2 PREVIOUS WORKS:

The CITES secretariat assists and provides advice on the compliance and enforcement of the Convention through several mechanisms which is listed in the Guide to CITES Compliance procedures. Online and digital data gathering with regard to non-compliance is encouraged by CITES and other UN agencies. In 1997, the CITES secretariat introduced the Trade Infraction and Global Enforcement Recording System (TIGERS). TIGERS facilitated the recording of information about wildlife crime and illicit trade received from a variety of sources, especially from CITES management authorities and from national enforcement agencies.

---


6 Kyodo News; UN University launches system to combat illegal wildlife trade, September 21, 2006 http://home.kyodo.co.jp/modules/1stStory/index.php?storyid=272256

7 Reuters; New UN database to help combat wildlife crime, June 4, 2007 http://www.reuters.com/article/idUSL0476594320070604


ERS acted as a global repository of information, where national agencies could send details about a wildlife crime taking place at the national level. The system was not successful though due to inconsistent reporting, lack of reporting standards, limited national participation in system design and governance, and inadequate funding (CITES CoP13).

During the 14th Conference of Parties of the CITES convention in 2007, the secretariat admitted that the reporting process regarding the compliance of the Convention is poor and incomplete with one of the prime reasons being insufficient submission of information from the parties to the convention\(^\text{10}\). The document also mentions that the databases operated by the European Union, ICPO-Interpol and the World Customs Organization suffer from the same problems as those encountered by the CITES Secretariat with TIGERS, namely that analysis is extremely problematic because there is not a widespread or uniform submission of data. The case of TIGERS database indicates that the development and operation of global models on enforcement will be difficult without an existing infrastructure at a national level.

1.3 WEMS AS A COMPLIANCE MODEL

At the regional and global level a common framework in collection, compilation and analysis of data and with uniform compliance measuring mechanism will provide more timely information and analysis and facilitate wildlife crime prevention enforcement efforts.

WEMS model is thus designed to enable a common platform for CITES parties to come together, using the analysis from their own national WEMS databases. This could be done either by networking between two WEMS systems (bilaterally, if countries agree) or by bringing out the various analysis to an international discussion table. Since the system is designed using a single operating system, it will also address the issue of interoperability. This will also ensure the effective compliance to the CITES convention and will help to build up a scientific mechanism to measure compliance at local, national and international level.

This Hand Book articulates concrete steps to implement the WEMS project at a national level considering both the environmental governance and electronic governance concepts.

CHAPTER 2

CONCEPTUAL FRAMEWORK OF WEMS

The conceptual framework of WEMS initiative is based around providing a mechanism to measure, understand and assess the various factors influencing illegal trade, its relation to the social and economic drivers, governance and institutions. In order to study and analyse these factors, it is important to carry out qualitative and quantitative analysis of key indices influencing or driving illegal trade. After reviewing several literatures and case studies, we have decided to use combinations of interventions proposed by a study by TRAFFIC and World Bank along with the Geographical proximity intervention developed by United Nations University.

According to World Bank, there are five major factors that influence illegal wildlife trade (Iw) and they are;

Markets and Prices (P_r)
Livelihood and Poverty (P_v)
Laws and regulation (L_w)
Resources (R_m)
Awareness (A_w)

2.1 LIVELIHOOD AND POVERTY

According to the livelihood based hypothesis, participation in wildlife trade is determined by the size and composition of people’s livelihoods and these therefore need to be changed if the illegal and unsustainable trade in wild species is to be reduced. This is commonly based on the hypothesis that investments which improve socio-economic status and diversify livelihood sources will reduce people’s participation in illegal and/or unsustainable wildlife harvesting for trade.

2.2 MARKETS AND PRICES

Consumer demand in legal trade of wildlife products is considered responsive to changes in retail price (and thus cost), their supply and, the market responses to changes in harvester and trader price (and thus profitability). The trend in illegal trade is very much consumer oriented and while considerations are similar to the legal trade, illegal markets are not dependent on taxes and prices.

2.3 LAWS AND REGULATION

Some researchers argue that, increasing the level and range of restrictions on wildlife exploitation, trade and purchase will reduce people’s participation in illegal and/or unsustainable wildlife harvesting, trade and consumption; and that strengthening the access rights of local communities to wildlife and wildlife habitat will reduce their participation in illegal and/or unsustainable wildlife harvesting for trade.

Legislation and regulations that are concerned directly with wildlife trade typically take one or two forms: either preventative (banning the harvest, sale or export of wildlife and wildlife products) or regulative (establishing controls or quotas on wildlife harvest and trade). In addition, a host of other norms, rules and codes of conduct (both customary and legislative, mandatory and voluntary) govern the conditions and procedures under which people are permitted to own, access, manage and use wildlife habitats and species.

Attempts to strengthen formal legislative and regulatory frameworks have had a strong focus on working with relevant government authorities to ensure that a comprehensive body of laws, rules and penalties are in place which cover wildlife trade con-
cerns, and that compliance and enforcement are improved.

2.4 RESOURCE MANAGEMENT

Here we would be looking into the capacity of governments and institutions in allocating resources to manage the forest and wildlife. This will include the budget allocation for protection of species and forests, allocation of human resources and adoption of alternate mechanisms like certification and labeling.

2.5 AWARENESS

Awareness interventions relating to wildlife trade have been applied via a diverse range of mechanisms (for example media campaigns, school curricula, road shows, documentaries and poster series), to a broad range of target audiences (including harvesters, traders, consumers, hoteliers, medical practitioners, Customs officials and the general public). The assumption here is, if there is clear awareness, illegal trade can be reduced.

2.6 GEOGRAPHICAL PROXIMITY

Proximity of natural resources to markets (local, nation and international) and its influence on illegal trade has never been studied. WEMS uses a series of spatial analysis methods to examine the geographical proximity intervention. Spatial maps showing the origin of the illegally traded species, transit points and destinations including the carrier used in the transport, will strengthen our understanding on the relation between geographical proximity and illegal trade.

Except for Markets and Prices, the rest of the interventions are regulated more by the behavior of the national governments where internal laws and regulation plays a key role in combating wildlife crime. It is noted that, though there exists effective laws and regulations, the external market prices and demand coupled by the poverty indexes at the wildlife resource base has lead to strength among the actors involved in the process to overcome or challenge the existing rules and regulations.

It is now understood that there is a relationship between the various factors mentioned above and its importance in combating wildlife crime.

The relationship can be empirically defined as;

\[ Iw=f(Pr, Pv, Lw, Rm, Aw) \]

In the case of WEMS, we will be limiting our findings to price and markets, Law enforcement and resource management and will also include the spatial component, geographical proximity (Gp) which we are considering as having a linear correlation with factors affecting illegal trade.

i.e. \[ Iw=f(Pr, Lw, Rm, Gp) \] A modified eco-message form including the defined parameters for assessing the above mentioned factors is used for the purpose of quantifying.

The next set of indices (products of analysis) will then measure the level of awareness and poverty within a specified geographical space.

Thus, through the WEMS environmental governance framework, we plan to help governments to quantify illegal wildlife trade taking place within the national jurisdiction and also provide them suitable indexes to measure enforcement and compliance of domestic and international laws with regard to wildlife trade.

Standardization of information is one of the key requirements in measuring compliance. WEMS software is designed to capture the information at the local level and then convert it into national and global indices.

In the coming chapters, we will be explaining the implementation of WEMS system and its requirements.
CHAPTER 3
IMPLEMENTATION OF WEMS

As mentioned in Chapter 1, the primary objective underlying the WEMS implementation plan is the emergence of a shared vision in which the national agencies recognize the importance of monitoring enforcement and compliance of national wildlife law and makes mandatory regulation in ensuring compliance with CITES convention. National governments are already aware of the need for environment related technology and their needs have been cited during UN General Assembly meetings and some, even before several MEA’s including CITES convention entered into force (UN general Assembly Document 2997 (XXVII). 1972; UN General Assembly document 1975). Agenda 21, Chapter 40, paragraph 40.9, mentions that, relevant international organizations should develop practical recommendations for coordinated, harmonized collection and assessment of data at the national and international levels. National and international data and information centers should set up continuous and accurate data collection systems and make use of geographic information systems, expert systems, models and a variety of other techniques for the assessment and analysis of data. Developed countries and international organizations, as well as the private sector, should cooperate, in particular with developing countries, upon request, to facilitate their acquiring these technologies and this know-how (United Nations Department of Economic and Social Affairs 2004).

Taking into consideration the above UN recommendations, the process of WEMS implementation is defined as follows;

3.1 THREE LEVELS OF ACTION

The WEMS Implementation Plan first outlines actions on three main levels- Global Level, National Level and then in the State or Provincial Level.

3.1.1 GLOBAL LEVEL

The global level actors are WEMS Global Project Management Office (GPMO) and the United Nations bodies that act as advisors to the overall implementation process. The other global actors include multinational companies which provide the infrastructure to the project, and universities and civil society which will help in the process of capacity development. The role of global partners is to enable the proper functioning of WEMS at the national level and help to replicate the project in different regions.

The global actors will also help national bodies in all advisory and training procedures. The national bodies then articulate corresponding internal actions that are needed to support WEMS implementation, focused on staffing, budget, and change management. The plan is a long term effort for more immediate actions that governments should consider while implementing WEMS.

3.1.2 NATIONAL LEVEL

Before the national level implementation of WEMS, it is important to look into the country strategies (national laws and regul-

---


tions) that effectively and systematically address communication between various partnering agencies (stakeholders) and involve ministries, business, and civil society stakeholders. The WEMS national level implementation plan also enhances policy dialogue within the framework of the existing regulation to deepen the understanding of the functioning of the WEMS by and for the stakeholders. A national level programme coordinating office (NPMO) should be established bringing together various officials from the ministries (environment, customs and police) responsible for action. NPMO will oversee the whole functioning of WEMS at the national level.

The plan will also look into the significant knowledge of wildlife law issues that exist in the country and will also attempt to understand the critical governance indicators that will mark the procedures of implementation and the steps taken to enforce action based on the information. Please note the governance indicators will vary depending on the type of governance, geographical area, population and range of biodiversity distribution etc. Special emphasis will be given to CITES indicators (Goal 1)\(^\text{16}\) as defined in the CITES strategic vision 2008-2013.

The next step will then be to identify the capacity of the state level organizations partnering in the project and their capability to provide local support and governance for WEMS, including effectively coordinating data and information and the technological proficiency in using the software. The other component that has to be looked into, is the process of information retrieving and the levels at which they can be used. There is also a process of information verification at the national level before it is opened up for use for the enforcement agencies. To enable all the functions systematically and effectively, it was decided that NPMO will be the best to host the WEMS database and for carrying out the required analysis. This will save time and resources of other enforcement agencies and will help them to focus more on the ground work. Enforcement agencies will also be able to identify the scenario with regard to the trend in wildlife crime and the situation with their enforcement work in general. This will also help in inter-agency cooperation and will lead to effective law enforcement.

Identifying the technological strength and capabilities of agencies involved in inputting and retrieving information is a key to the success of WEMS. All agencies participating in WEMS should have good internet facilities and the personal should have sufficient knowledge on the WEMS system. As a first step, it is important to survey the IT capabilities of the participating organizations through a questionnaire enlisting the minimum requirements for the implementation of WEMS.

After assessing more systematically the strength and weakness of various agencies, policy recommendations or alternatives will be listed and, will bring together directives that can help the agencies to function according to their needs. Any agency that is not capable in participating in the project due to technological incapability should be provided support in enabling the minimum requirement. It will then be the role of NPMO to oversee this function.

### 3.1.3 STATE LEVEL

The primary input of data starts at the state or provincial level as it is understood that most of the state project offices (SPO) will be technologically capable to be the input source. A project manager appointed at the state level will be responsible for verification of the primary data before it is input into the WEMS system. The project manager should also make sure that he receives the data from the relevant enforcement agencies and will be in touch with them through a focal person at the agency. This will vary based on case by case situation in other countries.

\(^\text{16}\) Cites Strategic Vision: 2008-2013, The Strategic Goals, Goal 1—Ensure compliance with and implementation and enforcement of the convention.
3.3 DATA COLLECTION, ANALYSIS AND VERIFICATION

Data in the WEMS project refers to the primary information on any wildlife crime collected and compiled by the state project office (SPO) for inputting it into the WEMS system. Prior to inputting the data, there is a process of verification that is done by the Project manager at the SPO. The data sharing protocol is defined as follows;

3.3.1 THE PROTOCOL FOR INFORMATION SHARING

1) Data sharing and data access privileges completely rest within the portfolio of the Government. The National Programme Management Office (NPMO) decides the right of information on sharing and access.

2) Nominal information will be used only by the enforcement agencies of the country. Right of transboundary sharing will be decided by the national executive committee.

3) Non nominal information will be used for research (rights of data sharing reserves with NPMO) and can also be shared within various government and international organizations.

Figure: 1 Flow of information in the WEMS model
3.4 WEMS SOFTWARE

WEMS software (Fig 3) is a web-based application and is developed using open source frameworks such as Struts, Spring, Hibernate etc. Detailed description for these frameworks can be found in WEMS development report\textsuperscript{17}. The main functionality of the database is to manage data related to offenses collected from various enforcement agencies and provide real time query based on defined computer analysis. Data is stored as in the format as Interpol ecomessage. The database schema is defined before completing all the tasks related to data management. In this schema, several tables and their relationship are defined.

To the current model, GIS functionality is limited to location analysis and in identifying the trade route. As additional countries adopt WEMS, Further research will be carried out to prepare for further extensions and more precisely to integrate spatial analysis tools into the WEMS software. Some geographical data is already included as reference data so that it can be extended and modified later without affecting the functionalities of the WEMS software.

WEMS software consists of a single deployment component: wems.war that can be loaded into the deployment folder of any web servers.

Users on client machine can use popular web browsers like Internet Explorer, Firefox etc to interact with application via HTTP connections. Web Server interacts with Database Server using a JDBC (Java Database Connectivity) connection.

In the event of deployment, care should be taken to install the database and Web Server on the same machine. Web Server is Apache Tomcat version 6 and Database uses MySQL version 5. More details on the deployment and the use of WEMS software is described in WEMS user manual.

3. IMPORTANT POINTS TO NOTE WHILE ENTERING DATA

a) Each record (case) should have a specific serial number and a uniform registration code which will include country code, state code and year. This is very important for classification and referencing. The WEMS system automatically generates this code and provides a serial number based on the first reference data. It will be important to refer the code while sending the case during secure document transfer.

b) The type of crime should be also included. Different crimes have different charges and penalties and could be a violation of more than one law, so the legal reference is important.

c) Date and time of the crime/discovery will help in specifying the season and time for committing such crimes. Knowing this will help enforcement efforts to be focused and successful.

d) Location, coordinates, district name where the crime happened/discovered. Specifying the "hotspots" is one of the most important tools to prepare a patrol plan for enforcement.

e) Species involved and detailed description of the specimen is also needed to know what the targeted species are and, the descriptions (live, dead, parts, derivatives, etc) Quantity (number, weight etc).

f) Purpose of the crime should be detailed by the enforcement official to identify for example whether it was for trade, medicinal use, pet, food etc.

g) Scientific, common and local names must be provided to eliminate the confusion of the different species with the same local names. A link will be provided to the UNEP-WCMC trade database18.

h) It should also be verified whether the species is protected by domestic laws, or

---

18 CITES trade database maintained by UNEP-WCMC http://www.unep-wcmc.org/citestrade/
whether it is CITES Listed Species\(^{19}\) (Appendix I, II and III)

i) The modus of discovery of the crime, for example, by intelligence gathering, through informants, during a normal patrol, other sources etc should be noted. This is useful to know the various processes through which wildlife crime is discovered or reported.

j) Route(s) of specimen, country of origin (if possible), last re-export country, final destination and any other information about route. This will help to know if it is for local consumption or international use. The routes also will facilitate enforcement efforts and will make it easier to know which country is to be contacted and coordinated with.

k) It is very essential to know the methods used in committing wildlife crimes. Also it is useful to record evidence available at the site of the crime (traps, used ammunitions, blood samples, forensics etc).

l) Name(s) including nicknames and address(s) of the offenders (involved persons/companies) age, sex, nationality etc should be listed. Any other personal information that could be obtained is important to keep such data about offenders to ease their tracking and know the history and in identifying repeat offenders. Repeating the same crimes can double the penalty in regulation with most of the laws. Enforcement officials will know the operation sites for criminals which will ease combating them. This will also help to identify if an organized network is involved.

m) Date and place of arrests and by who (Contact of the officer in charge). The enforcement official who conducted the arrest should track the case in the court, so the court reference code will be needed. Also to know the final decision and on whether an appeal is required.

n) Disposable of the seized specimens. It is important to document the action taken with the specimen, whether it was released into wild (coordinates), send back to origin, euthanized, stored, etc.

3.6 ANALYSIS OF THE DATA

Once the information is entered into the database, the designated national institute will be responsible for analyzing the data. Various functionalities will be available for querying and will be available to the designated enforcement authority. The queries and analysis will be more defined based on the requirement of national enforcement agencies and environmental policy makers. Spatial analysis should be carried out using GIS and, simulation models (Fig 3) should be generated based on the information obtained.

The major outputs generated through WEMS System are explained in section 5.3.

---

\(^{19}\) CITES listed Species
http://www.cites.org/eng/resources/species.html
Figure: 3 WEMS – Simulation model – Tracking Analyst
Figure: 4 WEMS – Seizure Map

Figure: 5 WEMS – Data Clock
CHAPTER 4
FRAMEWORK FOR INTER-AGENCY COOPERATION

The framework identifies five kinds of tasks. This includes survey of participating agencies at national and state (provincial) level, gap analysis and recommendation.

4.1 SURVEY

Survey should be carried out in two levels;

4.1.1 NATIONAL LEVEL SURVEY

At the national level, NPMO will assess the agencies involved in the data utilization process. This will include their ability to view and retrieve information from the WEMS portal. Since the national level agencies constitute policy makers from both the enforcement agencies and the environmental agency, the national level survey will document the state of readiness for e-government and the relevant aspects of the national government system as a whole. This will be carried out through fact-finding visits to the agencies by the WEMS national project coordinator. A standard questionnaire will be used for this purpose in identifying the various challenges.

As in most countries, the Customs, Police and Environment agencies belong to different ministries. The Customs and Central excise which deals with transboundary seizures (mainly at seaport and Airport), usually belong to the Department of Revenue which is handled by the Ministry of Finance. The police and border security force (mostly involved in any crimes within the national boundary and at border check points) belongs to the Ministry of Home affairs. The Ministry of Environment and Forests deals with all policy level matter related to recording of the wildlife seizures. Unless there is a common policy framework for agencies to participate, it will be difficult to get all the agencies cooperating in the WEMS initiative. Hence, a workshop bringing together all the agencies should be the first step in ensuring active Government to Government cooperation and participation.

4.1.2 STATE LEVEL SURVEY

This will be carried out by State Project Office (SPO) involved in the project. The SPO, based on the directions from the central agencies, will cooperate in implementing the project at the state level. The primary task of SPO will be to collect and compile information on the various wildlife seizures taking place at the state level. The SPO will be the focal organ for WEMS at the state level and will be involved in the verification of information obtained from the various enforcement agencies. Prior to the survey, a workshop at the state level should also be carried out to bring together all the agencies participating within the state level and involved in the WEMS project. This will increase communication exchange between the stakeholders and also improve transparency between the various agencies.

4.2 GAP ANALYSIS

Based on the survey, gap analysis should be carried out to identify the insufficiencies within an organization in using or disseminating data through the WEMS model. The WEMS NPMO will communicate with the various national agencies (participatory agencies) regarding the improvements (including matters related to interoperability) they will have to bring in to make efficient use of the WEMS system.

4.3 RECOMMENDATION

Once the gaps are analyzed, the recommendations are made to overcome the gaps. This will also include policy level discussions, possible infrastructural changes and training.

4.4 TRAINING

As noted above, there are four layers of participants in the WEMS project.
1) Information collectors – Primarily state level enforcement agencies and the Forest agencies

2) Information compilers - Information received from the various agencies are compiled (data input) at the WEMS project office at the state level

3) Information analysts- The information analysts are researchers at the WEMS national coordinating unit which will analyse the information and bring it as a report.

4) Information Retrievers: The information retrieving agencies are primarily the national level policy makers at Police, Customs and Forests.

Hence training should be carried out at the above four levels to ensure complete participation of the agencies. Core technical training (a mandatory course for all the above units) will consist of courses on Electronic Governance and Environmental Governance.

4.5 RESEARCH

The aim is to build a solid foundation to make informed decisions concerning the issues of both wildlife policy and on information sharing mechanism (Government to Government (G2G)). The research can be subdivided as follows;

5) Research on Environmental Governance: Environmental governance research will include various aspects on policy research. This will be ‘need based’ research based on the requirement of the country.

6) Research on ICT for development (ICT4D): Research on (ICT4D): will be to improve the existing mechanism of Government to Government (G2G) information sharing mechanism.

4.6 DISSEMINATION

Information dissemination is an important step in bringing awareness and output of the project. The NPMO will be responsible for communicating with the media on all the progress of the project.
CHAPTER 5

MANAGEMENT

WEMS project involves a collection of tasks with well defined inputs (resources), outputs (deliverables), process and control (governing mechanisms). The project management office will constitute one at the Global level (GPMO) and, the national project cycle will be carried out by the project management unit at the national level (NPMO).

5.1.1 GLOBAL PROJECT MANAGEMENT OFFICE (GPMO)

The project management unit at the Global level will support the work of the countries. It will not engage in any of their internal policy matters. The main purpose of the unit will be to support the implementation process of WEMS and in facilitating the research activities within the country.

GPMO will also help the replication of the project in various other countries and if needed will be responsible for forming regional forums for overseeing the activities and functioning of the project.

The GPMO office will also work closely with the CITES and other related conventions as the outcome of the project has direct impact to the above mentioned conventions.

GPMO will also look into the fundraising and capacity development of WEMS and will also identify suitable agencies to partner. In order to make an organized approach, it is advisable to form a steering committee within the GPMO. The steering committee can be representatives from various organizations that are partnering with WEMS and will see the overall functioning of the WEMS at a global level. A project coordinator at the Global level will oversee the whole process of WEMS implementation at various countries. The project coordinator may also be a member of the steering committee reporting about the progress of the project.

Members of the steering committee should be assigned specific role apart from the general decision making process. The categories of their responsibilities will be as follows:

a) Governance

b) Enterprise architecture

c) Developing worldwide WEMS network of partners

d) Security

e) Fund raising

f) Research and policy making
g) Technology development and implementation

h) Information dissemination to the various agencies and multilateral environmental agreements.

i) Training and Capacity development

5.1.2 NATIONAL PROJECT MANAGEMENT OFFICE (NPMO)

The national level project management office will be responsible for the overall implementation of the project at the national level. The NPMO will be headed by a steering committee comprised of officials from ministry of environment, home affairs and Customs. The project coordinator for WEMS national programme will be the focal person of communication for NPMO.

NPMO will be responsible for overseeing the budgeting and staffing of the project. It will also have advisory roles to the various ministries and will be the overall unit for all matters of communication to civil society, United Nations Organizations and the industry.
5.2 INPUTS

The inputs needed to carry out the project include human, financial and technical resources. There are various measures to assure sufficient financial resources for WEMS, including central funding, joint-up funding provided by agencies and public-private partnerships. Technical resources include the WEMS software, hardware, networking and telecommunication. Human resources include technical and other staff available to carry out project tasks, depending on their backgrounds and skills. Technical know-how is the crucial asset that partners bring to the project. The availability of government resources is determined before the commencement of the project at the national level.

5.3 OUTPUTS

The deliverables developed through WEMS are broadly divided into tangible and intangible. Tangible results include the deliverables produced by various tasks.

The tangible outputs of WEMS project are;

1) WEMS IT infrastructure with the following capabilities;
   a. Report generation (Ecomessage)
   b. Statistical analysis- Including spatial and non spatial time series analysis.
   c. Simulation model- Spatial model describing time series movement of goods (Fig 3).
   d. Mapping functionalities enabled with WEMS-IMS (Fig 4)
2) WEMS user manual and Technical documents.
3) Training kit for training the trainers.
4) Wildlife Crime Atlas – Atlas of various species involved and locations of the crime
5) Research Report on the trends of wildlife crime including analysis from the WEMS database.
6) WEMS Data Clock – A chart defining the seasons of illegal trade in a calendar year (Fig 5)

The non tangible items in the project will be the existing knowledge expertise at the country level. This includes subject and technical expertise within a country.

5.4 PROCESS

The WEMS project framework proposes a set of tasks defined for each level of actions (Global, National and State level). The national Project coordinator is responsible for tactical planning, organization and day-to-day operations of the project. Steering Committee (if formed) will comprise of the heads of all partner institutions, government representatives and national project coordinator. The role of the steering committee will be to provide strategic guidance for WEMS and resolve any difference of opinion between partners. It is desirable to form a Technical Committee comprised of qualified representatives of partner institutions and including the state level project managers. The technical committee will look into providing all technical support, providing specifications for WEMS implementation and provide expertise in resolving various technical issues.

5.5 MONITORING AND CONTROL

Corrective and preventive actions should be taken to control the implementation performance. This could be done through a monthly review of the progress of the processes and by opening the performance information for open comments. This continuous monitoring gives the WEMS national team insight in identifying areas that require any special attention during the process of implementation.
5.6 STAFFING

5.6.1 STAFFING AT THE NATIONAL LEVEL

5.6.1.1 WEMS NATIONAL COORDINATOR BASED AT NPMO

Responsibility:

a) Coordinating with the state project officer to ensure timely input of state level data

b) Verification and cross checking of the data

c) Working with the central agency responsible for sending ecomessage to Interpol/ CITES.

d) Coordinating the functions of the IT project manager, GIS officer, statistical officer and Research officer

5.6.1.2 IT PROJECT MANAGER

Responsibility:

a) Will be responsible for the complete WEMS IT infrastructure, training and development of new tools kits for enabling WEMS enabled government.

b) Will look into the complete functionality of the system

c) Will work closely with the WEMS state project offices in ensuring the IT needs and requirements are met.

d) Will be responsible for all development needs and improvements with regard to enabling the capability of WEMS.

5.6.1.3 GIS OFFICER

Responsibility:

a) Will be in charge of the analysis and development of the WEMS initiative which will include the following

b) Development of the WEMS_IMS

c) Producing WEMS – data clock on the major species traded

d) Tracking analysis – development of tracking analysis on analyzing the trends of wildlife crime.

e) Will also work with the WEMS-research team to develop GIS based models.

5.6.1.4 STATISTICAL ANALYST

Responsibility

a) The statistical analyst will work with the research officer and the GIS officer to bring out monthly statistical report on the wildlife crime situation.

b) The statistical officer will also be responsible for bringing out a quarterly report on the trends of wildlife crime and the various socio-economic factors affecting it. This report will be provided to the WEMS country coordinator and will be published.

5.6.1.5 RESEARCH OFFICER

Responsibility:

a) The research officer will be a scientist and will be coordinating various research projects based on the data received in the WEMS model. This will include closely working with national institutions and as well as WEMS coordinator at GPMO.

b) Annual research report will be brought out based on the study carried out.

c) Will also be responsible for coordinating PhD and post doctoral research on the WEMS project.

5.6.1.6 PUBLIC RELATIONS OFFICER

Responsibility:

The project public relations officer will be the focal person for communicating with civil society and media. He will also be responsible for issuing press statements on the WEMS initiative.
5.6.2 STAFFING AT THE STATE LEVEL

5.6.2.1 PROJECT OFFICER AT (STATE LEVEL)

A designated state project officer will be the key person to receive data from the state offices of the customs, forests and police.

He prepares a standard procedure for the collection of information from the above mentioned sources.

The information received will then be input into the WEMS database. No other person will have the right to input information (see section 2.2)

The state officer will have right to edit information (information edited will be logged) and the national project coordinator will have exclusive privilege to do the final editing. The information is entered as and when a case is reported. The state officer will also identify a suitable focal person at the customs, police and forest (range office) to ensure timely deliverance of the data.

5.7 BUDGETING

The budget for WEMS country initiative should come through national budgeting. The staff should be permanent government staff and should be able to commit to the project full time. In situations where national governments are not capable of allocating funds for the project, it should contact the GPMO of WEMS project to facilitate donor support.

The cost of the project implementation varies with countries and hence the budgeting for the project should be the responsibility of the national project coordinator of the WEMS project.

5.8 MEASURING GOVERNANCE

Efforts to strengthen country policy and institutional governance should, over time, be reflected in improvements in measured governance performance. Therefore, a critical outcome of WEMS project would be to measure governance at different levels by defining appropriate indicators at state and national level. It is also important to continue to refine those tools that already exist in this area, and to remember that governance is multi-dimensional, that different indicators capture different aspects of governance, and that the appropriate indicator to use depends on the purpose. The national project management unit will define the indicators for monitoring the governance. These indicators will be country specific and need not necessarily not be replicating in other countries or regions. The indicators of Governance will be based on World Bank standards (World Bank 2007) and will be modified according the region.

5.9 RISK ASSESSMENT

WEMS will involve a lot of actors from different organizations, including several government officials from enforcement and policy organizations of the government, UN organizations, industries and civil society. In order to make a multi-stakeholder project successful, there will have to be consensus between agencies in sharing the works and data originating from the work. The biggest risk in the project will be failure in the consensus. Hence, all measures should be made to gain confidence of the stakeholders by ensuring better transparency. The next biggest challenge will be the risk occurring during the project. The best way to mitigate this risk will be to have a well defined project document defining the stages of resources input, processor functions and a definite project life cycle. There could be unforeseen factors as well, but a well planned project will also define mechanism for scope creeps. A stage by stage approach is needed in making WEMS project a success.

CHAPTER 6

CONCLUSION

Wildlife Enforcement Monitoring System project is an integrated approach where there is good convergence of technology and governance. The approach has been designed to enable all actors within an environmental governance framework i.e, enforcement officials, environmental policy makers, civil society and industries, to come together in answering the existing challenges with regard to illegal wildlife trade. WEMS provides a path but there are challenges in building support, fostering adoption and sustainability. For success, there is a need to build awareness followed by constant monitoring and evaluation. We have seen global business models reaching success with good utilization of information. Similarly, the success of WEMS will definitely depend on how widely it is used and how useful the analysis is in forecasting the trends in illegal wildlife trade.

National governments have a key role to play in making the initiative a success and United Nations institutions should provide an enabling environment to make WEMS effective. Overseeing the information in the analysis will not be a good idea as it may have negative impact on country participation. Secretariats of various conventions should never use the information from the WEMS initiative to penalize governments or lay sanctions and it should be noted that the primary objective of WEMS model is for national governments to improve the existing mechanism in monitoring compliance and enforcement. The civil society groups should be well informed and their importance as sources of information and expert advice and assistance must be recognized. However, the role of civil should be restricted to capacity development support of the WEMS unit and any operational activity should be with the agreement of the National Programme Coordinating Unit.

The use of information technology in environmental governance has increased in the past few years with some of the successful initiatives being the UNEP-WCMC databases. United Nations Environmental Programme has constantly encouraged national governments to use technology in environmental governance. For example, the Bali strategic action plan recognized the importance to develop national research, monitoring and assessment capacity to support national institutions in data collection, analysis and monitoring of environmental trends and in establishing infrastructure for scientific development and environmental management. UNEP has encouraged cooperation with multilateral environmental agreement secretariats, taking into account their autonomous decision-making processes, and other bodies engaged in environmental capacity-building. Decision of the Governing Council of the United Nations Environment Programme (UNEP) concerning the strengthening of international environmental governance recognized, among other components, the urgent need to develop a strategic plan for the provision of technology support and capacity-building to developing countries as well as to countries with economies in transition.

WEMS model has been designed as to the requirement of Bali strategic plan and it should be taken up as a one UN initiative, providing national level support whenever required. WEMS country initiatives will be the first of its kind where there is an integrated approach in combating illegal wildlife trade.
