The Environmental Education of Migration Birds Using a Near Time Web-based Design

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Abstract: Raptor Migration is one of the most famous ecosystem mystery phenomena around the world. Both Malaysia and Taiwan are located on the flight path of the migration tracks of raptors in East Asia. For the past years, researchers associated with the Kenting National Park used a Doppler Weather Radar (Central Weather Bureau) to investigate the migration tracks of raptors, few episodes achieved very successful results. This study is to build up an information system which uses satellite images and Doppler Weather Radars to identify the raptor signal from the radar echoes. It is also going to build up a data flowchart, data base and Geographic Information System (Google Earth) for a near-time display. This system will provide the migration information for academic research, surface surveying and also for tourists and amateur bird watchers. Based on the near time track skill improvement, this study designed a web-based migration bird education for the public, we used web skill to demonstrate the near time migration track of raptors, the watching locations, as well as the e-book to introduce species of raptors.

Keywords: Raptor Migration, Web-Based Learning, Environmental Education

1. Introduction

Raptor Migration is one of the most famous ecosystem mystery phenomena around the world. Both Malaysia and Taiwan are located on the flight path of the migration tracks of raptors, especially where the Asian Monsoon directly affects the weather, Taiwan is a very important site for studying migrating raptors in East Asia. For the past years, to using a Doppler Weather Radar to investigate the migration tracks of raptors is a new skill to improving the track watch, Taiwan and Malaysia star the international project originated from the use of meteorological radars in monitoring the conditions of clouds and rains with radar.

The Doppler weather radar at Kenting, first set up in 2001, is especially useful in monitoring severe weather systems like typhoons that may inflict terrible damage to the southern part of Taiwan. It occasionally also detects echoes reflected from flocks of migratory birds. That gave the bird-loving KTNP Headquarters the idea of tracking birds with radars. The first attempts failed as the data received was too complicated and required human interpretation, which was time-consuming and error-prone. After the NCU scientists put in place an information system which uses an all-sky camera to identify radar echoes and conduct surface surveys, and also to build up data flows, a database and Geographic Information System (Google Earth) to form a real-time display system. Weather, sea and man-made noise is removed automatically and only the raptor information is displayed. It has met with great success in collaborations with KTNP in tracking birds by radar. Now, not only can noise in the radar be identified and eliminated, but the directions and routes as well as the times and locations of landing can be accurately monitored and forecast. This is an important advance in both bird conservation and bird-watching activities.

Usually, it is a matter of "Luck" for bird-watchers to enjoy following raptors in spring as the

birds usually come in from the sea. Unlike autumn, in spring the raptors stay overnight in the Kenting area before leaving Taiwan to continue their flights. People then can enjoy watching the raptors land in the evening as well as rising in the morning. Even the most experienced officers of KTNP cannot guarantee where and when one will see the birds in spring. With the help of radar, it is easier to know where and when the raptors are going to land in spring. On the other hand, we know where they are leaving for in autumn.

Analysis of radar echo data shows that it is now known that these birds have already decided where they are going to land when they are about 100 km from their destination,. Researchers can tell from the radar data the birds' migration habits, flight altitude, speed, and other elements. They can even recognize when there is a coup among a flock of birds. However, more care must be taken in providing the information and promoting bird conservation; otherwise the project will help not just bird watchers but also hunters, and cause irreversible harm to the ecology.

Based on the near time track skill improvement, this study designed a web-based migration bird education for the public, we used web skill to demonstrate the near time migration track of raptors, the watching locations, as well as the e-book to introduce species of raptors.

2. Design of the Migration Raptor Tracking System for Education

The educational purpose of this information system is to attract people who is interested in nature environment and bird watching. It is very important to show the target of the system on the homepage (figure 1). Users can get the information what they want to know by selecting the functions that provide from the website, we use Java scripts to make the Raptor Migration Information System running faster and a few part functions to design a new type of inquiring function to help the users find their request.
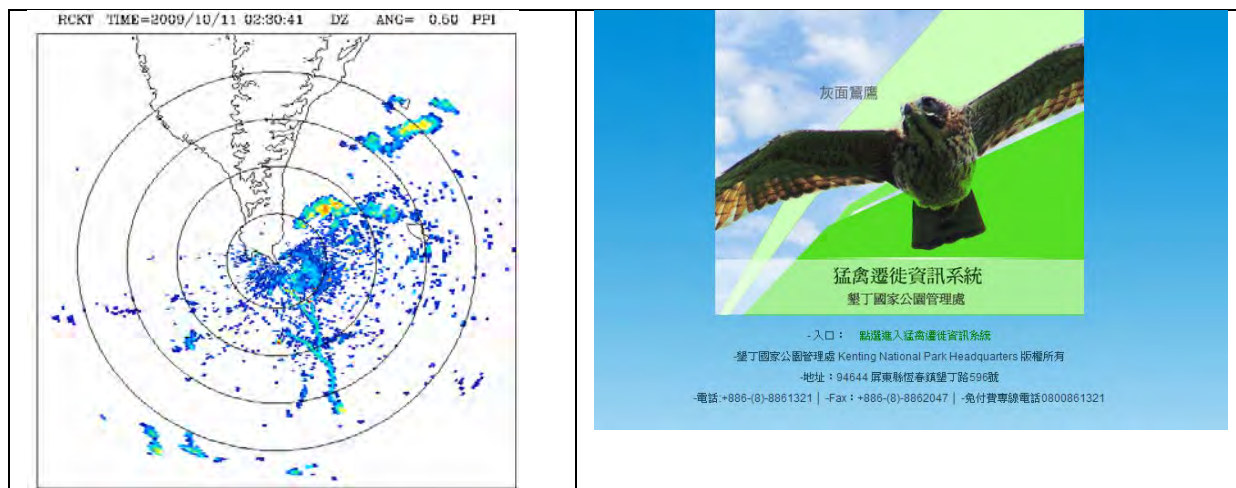

Figure 1. The welcome page of the Migration Raptor Tracking System

On the welcome page (Figure 2), the information includes project introduction and Features. We display animation about the successfully identify of raptor migrate case in recent years, help the users with knowing how the Raptor Migration Information System works easily. Renew display photo function, linked the upload photo in backend database and display photos at Homepage. An timely automatic statistics dynamic charts and bar charts regarding to the count of raptor migrate in Spring and Fall at bottom are also shown. The right sidebar is about the Sharing function, Visitor numbers, Member login, Raptor-expert message board, Raptor migrate of the season and related link.

We also design the Green Map (GM) of Raptor in Kenting for presenting the most species of raptors in the local area (Figure 3), GM is a map that promotes nature, sustainability, and ecology (please refer to http://www.greenmap.org/greenhouse/files/gms/GreenMapIcon_V3Chart.pdf), it is usually used to demonstrate the relationship between people and the environment. From 2005 to present the GMs are

widely applied in outdoor education, even in Malaysia and Taiwan, a lots of GM are used to introducing schools, national parks, cities…etc., therefore, we used GMs as materials for raptors. Our design also embedded QR Codes into the program (Lai et al, 2013), it is a linked function provided the raptor information in Kenting area and video player by click the different raptor pictures.

Figure 2. The raptor information of the Migration Raptor Tracking System
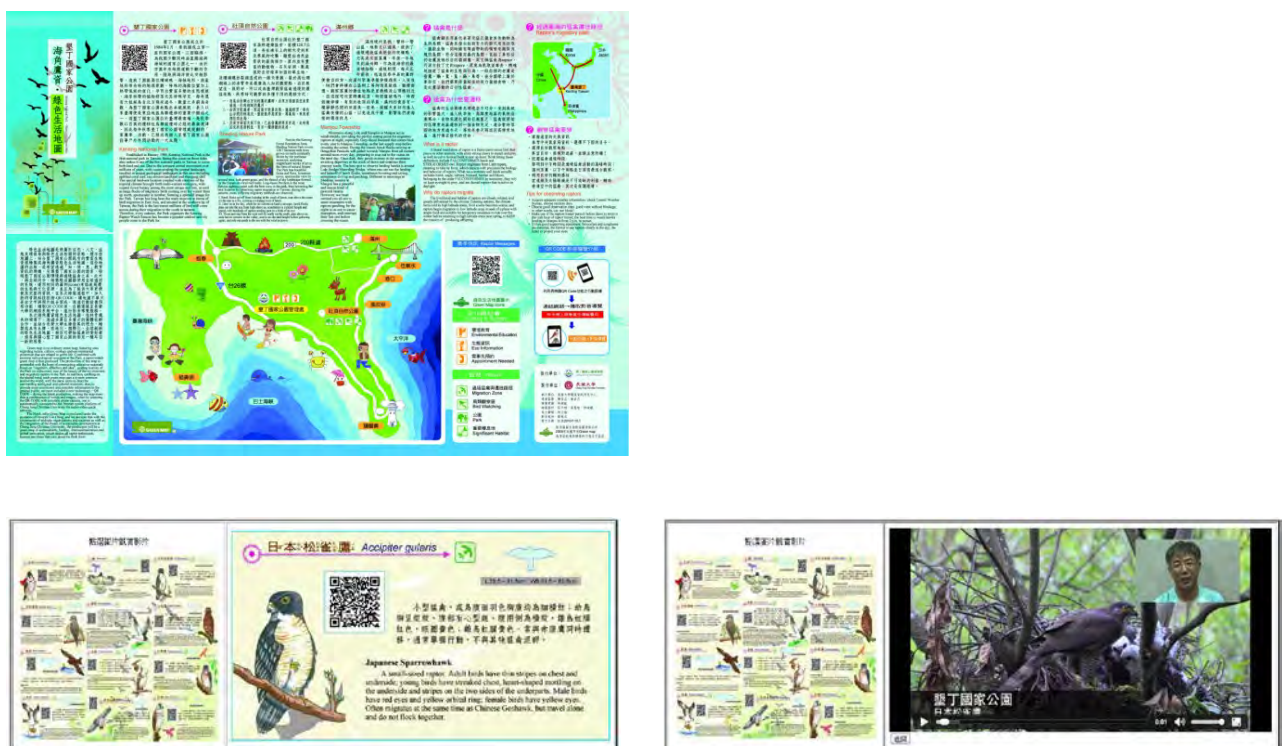

Figure 3. the Green Map (GM) of Raptor in Kenting

An e-book (as known as electronic book) is a book publication in digital form, consisting of text, images, or both, readable on computers or other electronic devices. (http://en.wikipedia.org/wiki/E-book). It can be viewed in screen associated with computers, tablet PC, hands on smartphones. Now not only adults read an e-book, but also applied in children's education, it is over 50% of Americans by 2014 had a dedicated device, either an e-reader or a tablet, that is a great potential for the education in using e-book. By introducing the near time migration message could be involved in the e-book, a database of the successfully identify of raptor migrate cases are loading in the e-book system.

Added a database of the successfully identify of raptor migrate case(Figure 4), the identify system is one of the most features functions. By identify the signal on radar while the raptor migrate and display on website in time, there are many successfully identify cases are sorted in database, users can known the raptors's processes and habits when they were migrating by this cases.

Figure 4. The e-book of the Migration Raptor Tracking System

3. Discussion

From 2009 to 2010, camera field experiments were conducted to improve the radar echoes validation. We find the all-sky camera is a very useful instrument in conjunction with the weather radar to distinguish the raptors and clouds. Since 2010 we focus on the radar image recognition with more accuracy to create a complete information platform of the birds. The satellite image appending tests were carried out in spring and autumn to improve those parameters deduced by the weather radar.

The study has also worked an international cooperation in migration raptors education, there are 5 countries, hundreds of people were using the website to understand the raptors. It was also promoting in an international workshop hold in Penang, Malaysia (Figure 5), the participants were all experienced the system and made clear understanding with the migration raptors. This study will continue to serve in Spring and Autumn, and develop more convenient path as well as tools to help people in environmental education.

Figure 5. The international education path in using the Migration Raptor Tracking System

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