ABSTRACTS

Without full-paper

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STUDYING THE IMPACTS OF MAN-MADE TOPOGRAPHY ON MANGROVE FOREST – CASE STUDY OF CANGIO AREA, HCMC-VIETNAM

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ABSTRACT

On wetland regions, Mangrove forest plays a very significant role, its communities are vulnerable to hydrological alterations and other types of disturbance, especially the change of the topography. This is the very important problem now in CanGio area - the estuary of Dong Nai - Saigon river system, located in the South of Vietnam.

The purpose of this research is to analyzing and assessing the impacts of the developing roadways activities on Mangrove forest. Using Geoinformatics tools (GIS-Remote sensing- Modeling) combining with site survey as the methodology for the study.

The result shows the scenarios of infrastructure developing that affect on Mangrove forest and shows some recommendations for the purpose of sustainable development for the area.

AN APPROACHING TO RESEARCH AND DEVELOP GEOINFORMATICS BASE ON OPEN SOURCE SYSTEMS

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ABSTRACT

Following the development of OSGeo Foundation, we are including the researchers from Vietnamese Academy of Science and Technology also setup a VN-OSGeo group to join to the community of OSGeo for the developing Geoinformatics.

Our goal is based on the actual local needs which is reasearch and develop high value GeoInformatics products and services for the development of social and economic, such as applications of geoinformatics for environment management, land use,...

Further more, we are trying to archive the potential technology to develop the open source system of Geoinformatics for local and global issues.

At the time being, our initial approaching is localized the basic knowledge related to Geoinformatics and then integrate them to our elearning system and introduce the open source Geoinformatics system to reaserchers in local. This will let us to find out the potential researchers for Geoinformatics domain.

In our activities, we are also collected the data from some of regions and deploy with the open source Geoinformatics system for promote to the community. The 3D applications research will be the long term focus of research plan.

Our expectation is become a part of developers joining to Open Source Geoinformatics projects.

ASSESSMENT OF WATER AND TEMPERATURE STRESSES OF VEGETATION IN URBAN AREAS BY ASTER

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ABSTRACT

The urban heat island phenomenon is becoming a serious problem, and occurs as a result of mixed effects by anthropogenic heat discharge, increase of artificial impervious surfaces, and decrease of vegetation cover. The role of green vegetation in urban areas is particularly important to mitigate the heat island effect, because latent heat flux due to evapotranspiration from plant leaves can lower temperature in urban areas. However, vegetation in urban areas is often under two types of stresses; water stress and temperature stress. The aim of this study is to develop a new practical index to assess the water and temperature stresses of vegetation in urban areas by using satellite remote sensing. The target area of this study is the city of Nagoya, Japan. The authors used the ASTER data acquired on July 10, 2000, and May 25, 2004.

In order to assess vegetation status in urban areas, several spectral indices have been proposed and utilized. Normalized Difference Vegetation Index (NDVI) is widely used to know a leaf area or amount of chlorophyll in each pixel, while Normalized Difference Water Index (NDWI) indicates a total amount of water in plant leaves in a pixel. Maki (2004) proposed Vegetation Deficit Index (VDI) by combining the NDVI and NDWI for the purpose of evaluating forest fire risk. The VDI is defined to exhibit whether vegetation has enough water or not by measuring the distance from the maximum water quantity line in the NDVI-NDWI plot. Furthermore, as the status of vegetation is reflected not only in the water stress but also in surface temperature of vegetation, the authors newly propose Vegetation Water Temperature Index (VWTI) by combining the VDI and normalized surface temperature (Ts). ASTER covers a wide spectral range; the visible to near-infrared, short-wave-infrared, and thermal infrared regions simultaneously, and this advantage made it possible to develop the VWTI by combining the spectral bands of these regions. The VWTI consists of VWTI_1 and VWTI_2; the former shows stress intensity, while the latter indicates relative balance of water and temperature stresses. It is a sort of orthogonal transformation in two-dimensional space from the VDI and Ts axes to the new axes of the VWTI_1 and VWTI_2. Namely the VWTI_1 is defined as a sum of Ts and VDI, while the VWTI_2 is a difference between Ts and VDI.

From the VWTI images, we can easily judge the condition of vegetation. The higher the VWTI_1, the larger the stress intensity of green vegetation. In contrast, the lower the VWTI_1, the more healthy the green vegetation. On the other hand, a positive VWTI_2 value indicates that the temperature stress is larger than the water stress. A negative VWTI_2 value indicates that the water stress is higher than the temperature stress. By using these indices, the authors tried to map the status of vegetation stress in Nagoya, Japan.

The vegetated areas in Nagoya showed different VWTI values according to a variety of conditions such as micro-climate, plant species (different tolerance to water stress), plant maintenance, topography, soil, geology, and so on. Moreover, the ASTER data of different seasons showed different VWTI values, which are consistent with the air temperature and rainfall data. Consequently, we can conclude that the VWTI is useful to assess water and temperature stresses of vegetation in urban areas.

NETWORKING: A MANAGEMENT STRATEGY FOR FUTURE OF REMOTE SENSING & GIS INTEGRATION IN NIGERIA

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ABSTRACT

As a management strategy for future of Remote Sensing & GIS Integration in Nigeria, appropriate approach to networking will certainly bring out the expected results in terms of organizing the people to working groups; forming clear objectives making the people to participate, getting the necessary financial needs and working and avoiding unhealthy competition among other networks .networking stands to be a practical oriented management tool which co-opts people right from the grassroots even to an advanced level of policy making .This paper discuss the concept of networking among stakeholders in future of Remote Sensing & GIS Integration in Nigeria.

REARCH AND CAPACITY BUILDING IN FUTURE OF REMOTE SENSING & GIS INTEGRATION IN NIGERIA.

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ABSTRACT

This paper gives a general overview of research and capacity building as they relate to future of Remote Sensing & GIS Integration in Nigeria.

Definitions of some common terms were presented . Social or Remote Sensing & GIS Integration in Nigeria, models were examined while action plans for different levels were recommended .At the individual and national levels, training and information sharing are considered crucial to ensure sustainability and equity. At Government level, allocation and timely release of funds and other resources to future of Remote Sensing & GIS Integration in Nigeria, projects Should be pursued vigorously. The paper further recommends that a multidisciplinary and multi-locational research and development strategy should be adopted for future of Remote Sensing & GIS Integration in Nigeria.

GEOGRAPHICAL MARINE RESOURCE INFORMATION SYSTEM APPLIED COASTAL ZONE MANAGEMENT IN INDONESIA

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ABSTRACT

The main characteristic of Geographical Marine Resource Information System, geospatial database will be core of the information system that will support planner, decision makers, and others stakeholder in executing their activities. Spatial data and information system provide important support for marine and coastal resources management planning in Indonesia. It's the largest archipelago country with biodiversity is the wealthiest of the world. However, the management effort nowadays is not sufficient for sustainable development. Exploitation and utilization of coastal area has resulted in many problems mostly due to over-exploitation of natural resources that result in degradation of land and water qualities. Government of the Republic of Indonesia has been set up several activities to address the problems.

In this paper will describe the coverage of survey and mapping activities, and how Geographical Marine Resource Information System (GMRIS) has been implemented for coastal management in Indonesia. It has been acknowledged that GMRIS is required to assess the coastal condition and formulated management plans for the areas. Unfortunately, a comprehensive set of spatial data for most of coastal areas in Indonesia is still limited, even distributed in several technical institutions. Survey and Mapping programs has been conducted, even with international cooperation, to accelerate the fulfillment of spatial information along the coastal areas. Strengthening the survey and mapping activities, there area two long terms projects dedicated to establish spatial data required for coastal management in Indonesia. The first project is Marine Resources and Planning Project (MREP) conducted during the period of 1993 – 1998. The second project is an ongoing project, and the continuation of MREP known as Marine and Coastal Resources and Management Project (MCRMP). This project started in 2001 and will be ended in 2006.

Keywords: Spatial Information System, Spatial Data, Coastal Management,

ESTABLISHMENT OF INTENSITY-DURATION-FREQUENCY CURVES

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ABSTRACT

The rainfall Intensity-Duration-Frequency (IDF) relationship is one of the most commonly used tools in water resources engineering, either for planning, designing, or operating of water resource projects, or for various engineering projects against floods. The establishment of such relationships was done as early as in 1932 (Bernard, 1932). Since then, many sets of relationships have been constructed for several parts of the globe. However, such maps with rainfall intensity contours have not been constructed in many developing countries, including Vietnam. There is therefore a high need for IDF curves in the monsoon region of Vietnam. This research is to construct IDF curves for seven stations in the monsoon area of Vietnam and to propose generalization IDF formula using base rainfall depth, and base return period for Red River Delta (RRD) of Vietnam.

MAPPING VEGETATION USING LANDSAT DATA IN BA VI DISTRICT, HA TAY PROVINCE, VIETNAM

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ABSTRACT

Vegetation represents a major dynamic land cover that can and should be mapped with remote sensing technology to provide up to date information for land use planning and management at different levels. The present paper deals with the use of Landsat imagery, reference data, digital image processing and GIS techniques to map location, extent and condition of natural and cultivated vegetation in Ba Vi, a large mountainous district with high tourism potential of Ha Tay province, Vietnam. The mapped vegetation layer is stored in a geographic database and can be used as an input to spatial modeling for education, planning of rational resource use and environmental protection for district sustainable development.

APPLICATION OF SALINITY INDEX FOR DETERMINE SALINIZATION IN COASTAL ZONE OF HAI PHONG CITY

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ABSTRACT

Base on the geographical concept, salinity to soil and water is a natural hazard which related to difference factors of natural condition such as soil condition, river network, tidal and wave regime, climate characteristic... in other, it also related to infrastructure basement as dam and tunnel system...along the coastal zone. Hai Phong is a province of coastal zone with number of river mouth and dense river network, various of tidal level, thunderstone effecting every year...so that, salinization is a main problem of natural hazard in the area.

By using Normal Difference Salinity Index (NDSI) extracted from SPOT and LANDSAT image, combined with related GIS data, distribution of different salinity level have been determined for drain and wet seasons. Integrated with GIS data, salinization also been predicted for the study area. Comparing with field data, result of the study show that the NDSI extracting from satellite data can be successful applied for monitoring the salinization along coastal zone.

GEOINFORMATICS MAPPING OF RENEWABLE ENERGY SYSTEMS IN THE PHILIPPINES

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ABSTRACT

Geoinformatics mapping is an innovative information and communications technology (ICT) tool which is useful for environmental and natural resources scanning and project planning which uses GIS, GPS, remote sensing, and the internet. The outputs of the project are needed not only for the design and implementation of rationalization measures but also for the conceptualization of financial, resource management reforms on renewable energy systems (RES) in the Philippines. Thus, a commissioned study was conducted to develop a geoinformatics-based decision support system (DSS) to establish geo-referenced data and information of RES in the Philippines, that incorporates and builds upon current understanding of spatial analysis; and operationalize such DSS for inventory, policy research and development on RES. The DSS called map analysis program on renewable energy or MAP RE was developed to build wealth of georeferenced data and information of the Philippine's RES for policy research and development planning. Geo-referenced database and thematic maps using major outputs of MAP RE showed various indicators that are useful for energy planning, inventory, and policy options for rationalization and resource management of the Department of Energy required under the medium-term energy planning, development and investment plan by the Philippines. The use of ICT-based survey databases are emerging dynamic mapping tools to share statistical data, information and knowledge among stakeholders on geographic areas and related policy issues. A graphic user interface visual programming linked with GIS, as well as thin and fat client internet mapping architecture will also be discussed. A case study is presented to demonstrate the use of MAP RE. Such methodological framework on MAP RE can be replicated elsewhere to promote exchange of knowledge and information in the third wave generation in ICT. Efforts to create a cadre of geoinformatics professionals, conduct of advanced ICT research studies, symposia and partnerships with local and international levels in the Philippines will also be presented.

GIS-DATABASE FORWATER SUPPLY AND WASTE WATER MANAGEMENT

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ABSTRACT

GIS and databases are very useful for improving the management and operation of a water supply. Management of water supply/waste water and relative information is receiving increased attention. GIS is a very valuable tool for carrying out reduction of NRW in the most cost/effective way. This paper gives an introduction to a comprehensive database for the water supply/waste water network and customer information system in GIS. The database structure and user features is based on many years of practical experience from real applications in Vietnam, Denmark and other countries.

The paper also gives an overview on the availability and quality of spatial data in urban areas of Vietnam. The link between spatial data and the water supply/waste water network will also be commented.

Keywords: Water supply, wastewater, GIS, base map, database, Non Revenue Water (NRW), assess management

MODELING INFLUENCE OF WATER OBJECT TO AIR POLLUTION DISTRIBUTION BY STACKS FOR SUPPORT TO PLANNING

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ABSTRACT

Usually the thermoelectric station and industrial factory with high stacks are building near river, lake or artificial water objects. On the water surface the air fluxes change their structure on the results of difference of temperature and surface roughness. In addition a water surface and a land surface influence the distribution of air pollution by stacks differently, so we should take into account the influence of water surface in the planning tasks.

This task is split on 2 stages: 1/ researching dynamics of wind velocity and turbulent coefficient fields; 2/ calculating pollution concentration by solving equation of turbulent exchange with coefficients defined in the 1 stage. The air flux characteristics are found by solving system of thermo-hydrodynamic equations, closure equation and equation of mass transport and diffusion

APPLICATION OF LANDSAT TM 5 IMAGES TO SUPERVISED AND NON-SUPERVISED CLASSIFICATIONS IN THE NORTHEASTERN REGION OF ARGENTINA (SOUTH AMERICA). CREATING PROXIES TO AUTOMATIC NATURAL RESOURCES MONITORING IN MID-DETAIL SCALES

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ABSTRACT

This paper deals with Landsat TM 5 satellite images. They were employed in supervised and non-supervised digital automatic classifications. Several algorithms were used as well as several common programs, commonly related to many digital image process works.

Our study testing area was located at the east side of the inter-tropical latitude of Chaco Province which was early deforested on XIX and XX centuries. So, this area embraces about 7.000 km2. Large sectors of soya bean, indian corn, sugar-cane, lucerne, vegetables and extensive cotton agriculture commodities are the principal resources for men there.

Training sites were defined and distinguished among natural and anthropic ones. Ten classes were finally adopted for mapping, after many tests carried out employing with 6, 7, 8, 9, 10, 11, 12, 13 and 14 training regions. The images employed were Landsat TM 5 226/79 and 227/79. The images were acquired at the wet period March (summer). These serve us in order to largely improve contrast between landscape elements. Previous field recognition of the area was done and it results very helpfully during computational works.

Several algorithms were used. K-means, IsoData (non-supervised), Maximum Likelihood, Improved Maximum Likelihood and Neural Net Analysis (supervised). In order to improve the result we used automatic post-processes algorithms too.

A good discrimination was observed in cattle-rising activities and forest units as well as deforested sectors. Incipient erosion processes of desertification and soil degradation was determined. Water bodies as well as the newest incipient reorganization drainage system (starting on 3,000 to 6,000 years B.P.) were clearly remarked. Mangroove forests follows joint to small rivers were outstandingly outlined by automatic process. Main elements of geomorphology were appropriately appointed too. Special discrimination was performed into floodable areas related to rainy periods. The final cartography were plotted and compared with false colored compositions 4/5/3.

Once we have spectrally characterized our primary testing region, then we extrapolated algorithms to north and south adjoining region (embedded into the same scenes). The geomorphologic landscape is equal in these areas because they constitute the same morphological unit.

We found that the proxies used in the pilot area result clearly positive using the same parameters into the north and southwards areas. However, and this point is crucial, we tested that the last general rain was uniform in all the area.

The method results of great utility to peer rural land management. The scales that varying about of 1:75.000 up to 1:100.000 -according to the pixel spatial resolution of Landsat TM 5 sensors- have resulted very appropriate in supervised and non-supervised classifications at east inter-tropical Argentina region. All the algorithms used showed adequate resolution and class discrimination. Neural net algorithm analysis gave best results in these tests.

THEMATIC 1:100,000 BASE-MAP OF SAN FERNANDO, DONOVAN, LIBERTAD AND 1° DE MAYO TERRITORIES AT THE NORTHEASTERN CHACO PROVINCE, ARGENTINA. FUNDAMENTAL STUDY-CASE THROUGH THE USE OF LANDSAT TM 5 IMAGES

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ABSTRACT

The present study deals with LANDSAT TM 5 satellite images under auspicious of Education Ministry Argentina Code 17/D033. The goal was to generate a thematic base-map 1:100,000 which emphasize the natural and human civil works including also cattle-rising activities over an area near of 7,000 km2. This area is largely dedicated to soya bean, indian corn, sugar-cane, lucerne, vegetables and extensive cotton agriculture commodities as well forest exploitation.

We used two raw scenes of Landsat TM 5 images (226/79 - 227/79). We used digital images processing software to handle digital archives. We geo-referencing the images using both field points and data extracted from cartographic maps draws at 1:100,000. Before to save the mosaick, we matches the pixels histograms of each one channels used. They were 4/5/3 which results best for this inter-tropical area. Then, we create an orthorrectified mosaick.

Enhancement and directional filters transformations were applied in order to be very evident the contrast and so differentiate elements that constitute this extreme flatter relief.

In spite of this classical composition for forest and wet areas, we only used the 3, 4, 5 channels. However, we generate a BIL file with the seven canals which was necessary for classified and non-classified purposes.

A grid of Gaüss-Kruger system was embedded into the base-map. The rectangles formed indicate a 10 x 10 km distance. Classical references were added too.

A vector file was added to mark the limits of the San Fernando, Donovan, Libertad and 1° de Mayo territories, using well contrasting colors. The base-map was then printing.

Over the generated base-map we visually discriminate geomorphological, hydrological, cadastral, civil works and humankind activities giving so a thematic character. We draw the main features using CADs programs directly in the monitor-screen so generating several vector files.

We concluded that this preliminary technological-spatial tool at 1:100,000 thematic base-map results of great benefit at inter-tropical environments and so help us to undestand land use and land management as well as for humankind planning as civil works and cattle-rising activities.

DEVELOPMENT OF HANOI BUS INFORMATION SYSTEM

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ABSTRACT

Public transport is an essential part of the modern urban life. Among various kinds of public transport, the bus is the most important one, especially in the developed countries. Maintaining a bus system is the most effective way to solve urban transport problems, but the use of bus is not easy for passengers in a big city like Hanoi because of a large number of cross bus lines and bus stop. In order to support bus passengers, the government of Hanoi City has published a number of maps about the bus system. In general, these maps give a lot of positive results, but they are still suffered from limited provided information.

With the aim to contribute to the development of Hanoi public transport system, the authors have conducted a research on using GIS, namely ArcGIS software, for creating an information system of Hanoi bus (HBIS). The system has some very useful functionalities as follows:

- Provide information about bus lines and bus stop with illustrate photos;
- Search for streets, bus lines, bus stops and specific objects by their name;
- Search for the fastest path between two or more places inside the city.

HBIS is an open system with friendly user interface, and the data can be updated and shared easily. The system can be extended for other kinds of urban transport (subway, bicycle, car,...) when needed.

LIVING ANGKOR ROAD : INTEGRATED GEO-INFORMATICS APPROACH FOR ARCHAEOLOGICAL STUDY

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ABSTRACT

In this study, the integration of remote sensing and GIS together with archaeology, anthropology, geo-physics, and the information system study are utilized for the study to identify and pin point the Royal road from Angkor to Phimai that was constructed by the king Jayavarman VII, the great king of Khmer Empire. From archaeological and historical studies, we had learnt that during his period, the Khmer empire was expanded to cover most of the area of the Southeast Asia.

Geo-informatics technologies have been utilized in the cultural heritage conservation, reservation, management, and research studies in various cases. For example, remote sensing and GIS can be used as tools for archaeological analysis together with conventional archaeological analysis methods. There are various cases around the world that remote sensing and GIS were used to assist archaeologists to pin point and help to identify archaeological sites that we can adapt to use in the area of Thailand and surrounding, especially, Cambodia, the country that have rich cultural resources

In this research project, we are studying the detailed of the royal road from Angkor to Phimai, its utilization, the people who lived and used the royal road, and the culture that had disappeared, and the one that has been continue to flourish along the royal road until today. The most advance technologies will be applied in the field of remote sensing, GIS, archaeology, anthropology, geo-physics, and the information system will be developed to gather all information from this study for the scholars to use. In addition, the data that will be developed from this project can be further utilized by the other related works in the fields of land use planning related to cultural management, tourism, etc.

During the course of this study, we had discovered new knowledge about the royal road from Angkor to Phimai including : parts of the royal road in Thailand and Cambodia, miss Dhamasalas, ancient infrastructures along the royal road, ancient industries and ancient communities along the royal road.

APPLICATION OF REMOTE SENSING AND GIS FOR COMMUNITY-BASED DISASTER AND ENVIRONMENT MANAGEMENT IN THE CENTRAL VIETNAM

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ABSTRACT

The central coast of Vietnam is frequently suffered from typhoon and monsoon flooding. People living in different environment e.g. city, coast, and mountain are facing different phases of disasters and required to develop appropriate measures for the prevention of damages and prompt recovery from them. Putting stress on the enhancement of the community?s resilience against disasters, academicians are challenged to substantiate how science and technology can contribute to the communities? needs based on deep understanding of the reality. A research cooperation toward community-based disaster and environmental management in the central Vietnam was initiated by Kyoto University and Hue University of Agriculture and Forestry. Involving experts from various fields including disaster management, architecture, agriculture, forestry and fishery, the project stands on a participatory approach where community members and researchers share opportunities of learning on the same ground toward disaster prevention, environmental management, and further strengthening of social and economic capabilities through proper use of local resources. Remote sensing and GIS provide useful technical basis for evaluating disaster and environmental risks and development potential. It is also expected to community-friendly information that helps better understanding of problems and development of solutions by the local people. The present paper introduces some on-going case studies utilizing remote sensing and GIS capabilities, and discusses their potentiality for community-supporting application.

The study is carried out in Thua Thien Hue province in the central Vietnam, which occupies a total area of 5,050 km2 with population of 1.1 million. Narrow flatland is formed along the coast, behind which steep mountain range lies bordering Laos. Short and rapid river streams, along with damaged vegetation on the hills cause abrupt discharge of intensive rainfall affecting great portion of the province including the capital city, rural settlements and fields. Three case study sites are selected, situated respectively in the upper, middle, and costal parts of the Bo/Huong river basin. (1) Hong Ha, a mountain village in the upper Bo watershed, is often and severely affected by floods. Land resources are also limited due to the topographic conditions. Analysis of aerial photograph taken before the 1999 flood and recently acquired QuickBird imagery, combined with field and household surveys, is carried out to clarify the influence of the flood and evaluation of potential land/forest resources. Facts and opinions from the community members are collected through interviews and focus group discussions. These information are compiled into maps representing vulnerable locations and activities in the community, and distribution of potential resources for production and environmental restoration. (2) Huong Van sits on a plain at the middle reach of the Bo river. Periodical floods affect settlements and fields near the riverbank and relatively low lands. Here a stress is put on enhancing production functions and economic capabilities to overcome the flood damages. Some pilot activities such as pig raising by women?s group are formed under community initiatives. Detailed studies on the topographic conditions and land suitability give supporting information to further strengthen their activities. (3) Phu Tan and Phu My are situated at the outlet of Huong river, fronting a huge chain of coastal lakes called Tam Giang-Cau Hai lagoon. Quality of the blackish water in the lagoon, which influences the people?s life and fish production, is highly affected by seasonal change of river inflows and transformation of the lagoon openings by rapid erosion and sedimentation. Large-scale conversion of paddy field into shrimp cultivation is also considered to cause deterioration of water quality such as sludge sedimentation and virus infection. Basic studies on the water environment and its relation to human activities are designed utilizing information obtained from a QuickBird imagery, such as water turbidity and shrimp pond distribution.

Field researches and data analysis are currently undertaken in the above three sites. Some tentative results will be presented in the full paper and oral presentation.

CHARACTERIZING URBAN SPRAWL AND ITS IMPACTS BY UTILIZING A SIMPLE SPATIAL METRIC IN A MEDIUM SIZED CITY OF JAPAN

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ABSTRACT

This study aimed to characterize urban sprawl as a specific process of urban growth dynamics for a medium sized city in Japan by applying combined use of remote sensing images and a spatial metric. The impacts of urban sprawl investigated in this study were greenery segmentation and isolated urban form in rural district. In addition, by visualizing urban spatial structure changes on an urban growth map, this study would produce intuitive and detailed information for urban planners and communities on urban spatial dynamics to evaluate conventional urban management.

Five remote sensing imageries from Landsat MSS, TM and ETM+ were obtained as input data and they were processed to discriminate three classes; urban, non-urban and water body. A spatial metric, percentage of like adjacency (PLADJ) was selected and calculated in a moving window. Then landscape configurations were classified in interior, aggregated and fragmented by establishing a threshold value. Incremented developed areas were categorized into infill, expansion and outlying growth by referring previous landscape configuration.

Toyohashi city was chosen as a typical medium sized city in Japan. The medium sized cities face severer problems induced urban sprawl rather than mega cites like Tokyo. Urban growth of Toyohashi from 1972 to 2002 was examined in a case study.

Results proved that categorized landscape configurations could be independent information on urban spatial structure that infers socioeconomic importance in urban planning. In special, both changes of fragmented urban and non-urban areas could be a measure for the degree of urban sprawl. By tracing landscape transformation, it was examined that these fragmented areas were likely produced by outlying and expansion growth. Produced urban growth maps could visually present urban development status in an urban growth dynamics on pixel basis. Therefore, this information could be expected to promote understanding on urban growth process they are facing at a smaller administrative unit.

In a case of Toyohashi, results showed that urban growth was in diffusion phase and sprawling development and its impacts were observed during the period from 1972 to 1985. Whereas, urban growth manner turned into coalescence phase after 1985 and dispersed landscape configuration was modified by increase of infill growth. It was considered that this transition was helped by a conventional zoning system that divides municipality into urban promotion areas and urban control areas. On the other hand, the merits and demerit of the zoning system was reviewed by examining results on urban landscape transformation.

Above all, the proposed method demonstrated its potentials of combined use of remote sensing and spatial metrics for charactering urban sprawl that is a process of urban growth dynamics. Furthermore, the results of this study contributed to review and assess the effects of conventional urban policy. This approach is useful for urban planning by local officials and communities not only for urban areas in Japan, but also for urban settlements that are facing common problems in urban growth management

INTEGRATED MULTISCALE AND MULTITEMPORAL REMOTE SENSING AND GIS SYSTEM FOR ASSESSMENT AND MONITORING OF ENVIRONMENTAL IMPACTS OF LIGNITE OPEN CAST MINING ACTIVITIES IN CENTRAL GERMANY

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ABSTRACT

Mining areas are in general regions which have caused very intensive and widespread environmental impacts. They represents world-wide one of the most intensive and far-reaching intervention into the ecological balance. The technology of opencast mines increases these effects much more. The entire ecosystem, including the morphology, and the ground and surface water regime, soil and vegetation structure are disrupted. The mining activities have been resulted to replacement of all geocomponents and the land users in the area, like agriculture, settlements, infrastructure, water supply and so on.

This world wide existing problem of heavy environmental impacts through mining activities shall be investigated in the lignite opencast mining area in Central Germany. Lignite has been mined in this area since more than 300 years and for the past 60 years it has been extracted by overburden conveyor bridges. More than 500km2 are completely destroyed through the mining. The consequence of this exploitation has been a completely new system, the "post mining landscapes". The new system is - regarding its structure and sequence of processes- a very complex, complicated and above all a highly dynamic system with specific morphological properties, sediments with specific properties, with the succession of vegetation and with hydrographical situation. The parameters are on the one hand completely anthropogenical determined- e.g. morphological forms in dependency on the mining technology and geotechnical reclamation processes- on the other hand they- are only anthropogenic initiated, however subsequently determined by natural processes. For instances in the test site tertiary and quaternary sediments, which are naturally not existing at the surface can get by the means of mining technology to the surface. The specific geochemical and following also hydrochemical properties have been caused processes which are often unknown or insufficiently known.

For areas of both active and abandoned mining is a urgent need for precise spatial and thematic knowledge's for assessment, monitoring and supervising of mining activities. Owing of the large size of the area, the dynamic fluidity of all processes involved, and the difficult conditions of field survey the task is well suited for multisensoral, multitemporal and multiscale remote sensing technologies.

The research is focused on two main fields:

- *succession of vegetation depending on the geochemical and hydrological situation, this means, low vegetation like algae, mosses, lichens, pioneer stage of vegetation, like sand dry grasses over long terms*
- *higher vegetation, like different tree types are depending in the vitality strongly from the geochemical properties of the sediments*
- *residual mining lakes with an acid regime and so on very special hydrochemical and hydrobiological properties*

For the regional scale we are using satellite data (Landsat tm5, ETM, 7, IRS, SPOT) and for the local scale we are using geometric high resolution data (HRSC-AX9 and hyperspectral airborne scanner data (casi, Hymap).

All data sets were geometrical corrected by their specific parametric and nonparametric rules and georeferenced using GPS measured reference points. The radiometric correction was carried out by the empirical line correction method based on the reference spectra measured in field campaigns. For the satellite data we were using the Maximum-Likelihood classification with added parallelepiped limits as well as spectral angel mapping and spectral unmixing processes. We have developed a special method for multitemporal changes, the FESPA method.

The hyperspectral airborne scanner we have used for the classification different vegetation types (pioneer vegetation, seeds of grass and vegetation types of spontaneous succession on the dumped sediments) as well as for the hydrochemical properties of the residual mining lakes.

The specific advantages of different algorithm for the various main objectives and the different sensors will be shown. The reached statistically reliable results of the classification are an excellent database for the monitoring of this extremely damaged area.

For the multiscale monitoring we developed a hierarchical classification system for all used airborne and spaceborne data sets with their different sensor properties.

All data, like field and lab analyses, spectral field measurements, digital evaluation models and remote sensing data as well as the special algorithm for image processing will be held in hybrid, modular structured GIS.

In combination with digital terrain models (aerial photos, HRSC data, Laser scanner data), multispectral, multitemporal and multisensoral remote sensing methods and GIS-data processing an integrated tool for monitoring is available.

APPLYING INFORMATION TECHNOLOGY IN RESEARCHING AND TEACHING VIETNAM HISTORY

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ABSTRACT

Information technology is being applied in the every field of socio-economic. This paper mentions the initial reality of applying information technology, especially is GIS in the researching and teaching history in Vietnam and proposes developed solution in the future at once.

1. VIETNAM HISTORY IN GENERAL

1. Vietnam is a monsoon-tropical country, stretching along the coast of the Pacific Ocean in the South East of Asia, both overlooking the ocean with the coastal length of 3260 km and connecting with the mainland in the position of successive mountains and rivers. This is the location of contact between the continent of Asian South East and the Islands of Asian South East, a meeting place of many flows of emigrants in history, and an interfering area of many cultures in the South East of Asia as well as the South East of Asia with China and India.

The nature in Vietnam is diversified, generally including coastal plains, midlands, highlands, forests and mountains, with the sub-climate areas and the diversification of animals of different kinds. This is an area rich in minerals and its nature is "generous", but extremely severe, fierce and likely to cause an innumerable number of disasters to people. Living in such a condition, people must know how to adapt themselves to the nature, exploit the advantages, find the ways to limit and overcome natural disasters and better themselves to improve and conquer the nature. The ecological environment has great influence on the people's life as well as the economic, cultural and social developments of the whole community. It creates many features of Vietnam history. So that, at the first, Vietnam history is the community's history of adapting, improving and gradually conquering the nature in Vietnam.

2. Ten thousands of years ago, there were people living in the territory of Vietnam. The South East of Asia, including Vietnam is one of the areas which are considered as the human cradle, an early agricultural centre of human beings.

Currently, there are 54 ethnic groups in Vietnam with the population of 82 million people, of whom the Viet people occupy a major rate of about 87 % of the population and 53 ethnic minorities account for about 13 % of the population. In terms of language, the

languages of the ethnic groups living in Vietnam belong to the eight groups of the Austro-Asian, Thai, Austronesian, Sino-Tibetan systems such as Mon-Khmer, Viet-Muong, Miao-Yao, mixed Austro-Asian, Tay-Thai, Tibeto-Burmese, Han, and Austronesian.

Generally, The Kinh group is an ethnic majority living in the plains and big cities, but some parts have lived in the midlands and the mountains for a long time. For the ethnic minorities, some groups have focused living areas; however, the common situation is to live insertionally (many ethnic groups live together in a village). Each ethnic group has its own language and its own cultural features. However, these groups have inserted into one another and lived together for a long time in an area, defended and built the country, so the relation of cultural exchange, mixture and harmonization takes place quite regularly and strongly. Vietnam history is the history a community of many ethnic groups. Of these groups, there are ethnic majorities, ethnic minorities, early ethnic people and later ethnic people. However, once integrating into the Vietnamese community, they combine their power and are unanimous in constructing and defending the country.

3. As we know, after the long development of the prehistoric culture, at the beginning of the Iron Age, there were three big cultural centers in the territory of Vietnam, which led to the foundation of the first ancient states. They are the Dong Son culture in the North which was associated with the foundation of Van Lang and Au Lac states; the Sa Huynh culture in the Southern Middle, which prepared for the appearance of Champa state and the Oc Eo culture in the South, which was the foundation basis of Phu Nam state.

Many historic projects of Vietnam from the ancient time to the present time only presented Vietnam history in the main flows: From the cultures of Phung Nguyen- Dong Dau- Go Mun- Dong Son, leading to the foundation of Van Lang and Au Lac states, experiencing the Chinese domination of 1000 years, to the states of Dai Viet, Dai Nam and Vietnam without concerning about the historic flows of Champa and Phu Nam states (Chan Lap state followed Phu Nam state) in the South. Many book sets of history presented Vietnam history as the history of Viet people's Southward march. It means that wherever Viet people moved toward the South, they started writing down Vietnam history there. The way of writing down history can't avoid being subjective and one-side and don't reflect the right process of Vietnam history. This leads to the misconceptions that the Southern territory is the waste land newly changed into the cultivated land and they have forgotten the extremely important historic and cultural heritages which constitute Vietnam history.

In the historic process of the relations among the states in the current territory of Vietnam, there were economic and cultural exchanges and reciprocal influences, but sometimes there were contradictions, conflicts and annexations among them. Vietnamese historians can't help researching and being aware completely and subjectively of that process in order to understand clearly the complete formation and development of Vietnam history.

With the same conception, in modern history, the French colony-occupied territory or the territory administered by the Republic Government of Southern Vietnam before 1975 must be considered to be part of Vietnam history. For a long time, the book sets of Vietnam history have only concentrated on the modern history of Vietnam in the form of main flows - the revolutionary history of Vietnam.

Vietnam history is the history of the inhabitants' communities, nations and the civilizations which were once formed, existed and developed in the current territory of

Vietnam. The development process of Vietnam history is wide-open and collecting, but the collecting is always the dominant trend.

4. The history of fighting foreign invaders is the main content covering the long and glorious history of Vietnamese people. Thus, researching and teaching the history of fighting foreign invaders is considered as the very important content of Vietnam history program.

In fact, fighting foreign invaders is not the specific feature of Vietnam history, but it became a demand for the existence and development of all nations and peoples worldwide a long time ago. However, the foreign invade fighting history of Vietnamese people is extremely special because there are rarely any people facing big and strong enemies in the unequal balance of power like Vietnamese people in the world history. The history of fighting foreign invaders is the history of gathering the national power; it is the crystallization of national vitality; and of course it causes the contrary effects and regulates many features of Vietnamese people.

The history of fighting foreign invaders is not all of the national history, but the economic development, cultural and social achievements, etc. are the bases of the country's existence and development and the material and spiritual strength for Vietnamese people to overcome dangerous hardships and make miraculous feats of arms in the struggle against foreign invaders.

The history of fighting foreign invaders is the remarkable and prominent features of the whole historic process, but the economic development and the socio-cultural achievements are the basis of the country's existence and development and are also the most important contents of Vietnam history.

5. The Feudal Regime's previous book sets of history were really the history of the royal dynasties and only focused the great political and military events of the courts. Many research works on modern history only concentrate on highlighting the lines and policies of the Vietnamese Communist Party and the State of Vietnam, but not clarifying how and where those lines and policies have been implemented. Recently some research projects of history have made efforts to delve into the history of the village communities, the history of the agriculture and the peasants, the history of factories, enterprises, workers, etc. Although these projects partially repaired the limited situation mentioned above, they seemed to be short of the general visibility. The public are the creators of history, the main owners and are the greatest in the national history. ***Vietnam history not only focuses the great politic events, the changes of royal dynasties and social regimes but also is the history of the whole nation, of the entire people, including the worthy contribution of working people.***

II ABOUT A NEW TEXT BOOK ON VIETNAM HISTORY (4 VOLUMES)

1. From August Revolution (1945) up to now, Vietnam has many text books of Vietnam history are as follows: *Vietnam history* with 8 volumes, published by the Education Publisher, 1960-1963, *Vietnam history* with 2 volumes, published by the Social Science Publisher, 1971-1985, *Vietnam history* Volumes 1, published by the University and technical Secondary School Publisher, 1983, *The General View of Vietnam history* with 3 volumes, published by the Education Publisher, 1998-1999, *The Evolution of Vietnam history* with 1 volumes, published by the Education Publisher, 2000, etc. These text books, each of which has basically strong points, mark the development of Vietnam history until the late decades of

the 20th century. However, each volumes can't avoid specific limits because if its specific situation and characteristics; but on the whole, the databases are poor and the approaching methods are subjective and one-sided.

2. The requirements for summarizing historical achievements in Vietnam and in the world, especially the over- 10 year renovation of Vietnam, stop at a comparably complete and precise, basic level and systematizing the complete formation and development process of Vietnam history from the origin to the present time give the Vietnam historians a very havy task. From 2001, I was given a State Subject by Ministry of Sciences, technology and Environment (Ministry of Sciences and technology now) for writing a new text book on Vietnam history follow these conceptions.

3. After the four years (2001- 2005) of implementing the plan of compiling the book set of Vietnam history in accordance with the mentioned directions, until now we have completed the four volume manuscript, including 13 parts and 46 chapters with the toatl of 2600 pages (has 51 maps and 360 pictures).

3.1. Volume I: Vietnam history from origin to XV century, including 4 parts, 14 chapters (Edited by Phan Huy Le. Authors: Phan Huy Le, Tran Quoc Vuong, Phan Dai Doan, Luong Ninh, Nguyen Quang Ngoc)

3.2. Volume II: Vietnam history from XV century to middle of XIX century, including 2 parts, 8 chapters (Edited by Phan Huy Le. Authors: Phan Huy Le, Nguyen Thua Hy, Nguyen Quang Ngoc, Nguyen Hai Ke, Vu Van Quan)

3.3. Volume III: Vietnam history from 1858 to 1945, including 4 parts, 13 chapters (Edited by Dinh Xuan Lam. Authors: Dinh Xuan Lam, Nguyen Van Khanh, Pham Xanh, Pham Hong Tung)

3.4. Volume IV: Vietnam history from 1945 to 2000, including 3 parts, 11 chapters (Edited by Le Mau Han. Authors: Le Mau Han, Nguyen Dinh Le, Truong Thi Tien).

This book set will be published by Hanoi Educational Publisher in the end of 2006 and early of 2007. For these reasons, we will synthesize and compile the book of about 600 pages so that the World Publisher can translate and publish in English and other languages in order to meet foreigners' demand for studying the history of Vietnam.

III APPLYING INFORMATION TECHNOLOGY IN RESEARCHING AND TEACHING VIETNAM HISTORY

1. Initial stage of using information technology in drafting the 4 volume collection of Vietnam History.

Along with the revolution in information technology and research methodology, we have utilized all the present advantages in order to explore, to collect and to systematize different sources in addition to the interdisciplinary method to write and present historical events. It is perhaps unprecedented all previous books on Vietnam history.

1.1. In the process, from the very general ideas to some specific historical events, we have been able to discuss the matters with scholars-Vietnamese or all over the world via internet, especially with first rate scholars such as: David Marr (Australia), Ketth W. Taylor (US), Furuta Motoo, Sakurai Yumio, Momoki Shiro (Japan), Yu Insun (Korea), D.V. Deopik (Russia), Liang Zhi Ming (China), Philippe Langlet (France) etc. They have invaluably contributed in the process of drafting, not only in terms of providing information but also different perspectives. It has certainly helped to produce an unbiased and accessible edition. Besides, we have also searched for information via internet at various libraries, collections to have more sources concerning the recent researches and writings of Vietnam history, particularly from academically and IT developed countries.

1.2. Concerning historical events, or issues we have also applied *Phuong phap thong ke dinh luong*, graphing, charting in researches as well as writing effectively. For instance, *Dia Ba* (Land register) is an significant source for historians to understand Vietnam countryside. The Land registers, recorded in two reigning kings- Gia Long (1802-1819), Minh Menh (1820-1840) with nearly 18,600 sets are presently kept at the National Archives I and Han Nom studies center. We have so far studied some sets to get some particular information to support an perspective or hypotheses. Having supported by IT lately, we have carried out a project *He thong tu lieu dia ba Vietnam* (Systematizing the land registers in Vietnam), in which thousands of data are systematically analyzed in regions, corresponding with present provinces such as: Ha Dong, Thai Binh, Ha Noi, Nam Dinh, Thanh Hoa, Binh Dinh and many provinces in the South of Vietnam). It is a breakthrough as far as historian is concerned - a more wholly, unbiased picture of rural Vietnam (not only at the beginning of 19th century but far back into the past) is being reconstructed. Similarly, we are working on various programs *Nghien cuu gia pha Vietnam* (Research on the genealogy in Vietnam), *Nghien cuu huong uoc Vietnam* (Research on village regulation in Vietnam), *Nghien cuu Chau ban trieu Nguyen* (Research on Imperial Archives of the Nguyen Dynasty) etc. These projects would greatly add more color into the picture of Vietnam history as the whole.

1.3. Our books include 50 maps, some of them drawn based on the comparison of maps in many generations-past and present; using satellite information to compare with the actual surveys. By using RS and GIS, we have been able to reconstruct the structure of Co Loa Citadel with its own characteristics. We have also examined different stages of development of the coastal areas in the North of Vietnam. Having also identified the vestiges of ancient rivers of the lower section of Thai Binh river, we have located the well-known cargo port Domea, relatively unheard in centuries. We have also advanced significantly in studying the vestiges of Thang Long Citadel and Citadel of the Ho Dynasty, the historical formation of Vietnam territory etc.

1.4. All the authors of Vietnam history are familiar with the exchange of information, sources and researching approaches via computers, especially in the process of drafting according to a particular form. The Prof. Phan Huy Le is the editor of the vol.1 and 2 in which different perspectives have been incorporated and substantially supported by information technology. Unlike other set of Vietnam History, we are introducing many pictures, maps, charts; they not only serve as illustrating point for the book but also being presented in a theme. We have try do, but the problem of applied informatics in the field of the research, education in history of Vietnam is almost only recently begun.

2. The use of information technology in researching and teaching Vietnam History in the future.

In the near future, leader at all levels, historian, professional information technology of Vietnam hope for development advantage of information technology in the historical study. The details are as followings:

2.1. Summarizing (total is 3000 and it will be reduce 600 papers with the many presentation of illustrate pictures) and it is also published on the internet the newest Vietnam historical book with many other foreign books. Actually because there is not Vietnam's historical book published and introduced outside Vietnam border.

2.2. Step by step create and improve historical and culture database of Vietnam

2.3. Applied RS and GIS for researching history of Vietnam during the flow of time, firstly the focus are old capital cities: Thang Long - Ha Noi, Tay Do (west capital) Thanh Hoa province, Hue Capital, Hoa Lu capital (Ninh Binh Province), Co Loa (Dong Anh - Ha Noi)...there are good ideas if we follow and expand the previous project which is carry out by Prof. Shibayama.

2.4. Apply problems of the 2D, 3D, 4D models for re-creating history, preserver and promote the values of the history and cultural in some main areas (Thang Long- Ha Noi, West-capital Ho Dynasty citadel- Thanh Hoa province, Hue Capital)

2.5. Absolutely computerizing all of the history museums in Hanoi, some provinces and cities, university, historical research centre in Vietnam.

With the interest in this field of leadership at all levels, the top researcher, and education centre in Vietnam. to obtain the zealous aids of many offices, scientists in the world and (representation for all of them today is the all of the participant in this conference), We believe that the application of the preeminent information technology for researching, training in the field of the Vietnam history will be successful.

DATA COLLECTION AND ITS USEFULNESS FOR CREATING DATABASE AND INFORMATION OF HISTORICAL MAP IN THANG LONG - HANOI

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ABSTRACT

This paper discusses the need for study about historical sites and most importance of these in study in Thang Long-Hanoi historical heritage, Hanoi has about 2000 cultural and historical sites among them include 633 site have already raked (500 had national rank) but many sites have not been managed and develop effectively. Combination applications advantage of the Information technology, GIS and Remote Sensing to study historical and cultural of Thang Long-Hanoi. The focus of this paper is the realization of the study historical sites and its applying for create Historical maps including time dimension, and how to use number of the data collections to build up relational database displayed base on 4D Historical map in the future. Also in this paper discusses potential that's number of historical materials can be used inf rmation extraction method to extraction requirement information relating with project.

1. INTRODUCTION

This paper research about historical sites which is one of the importances in the project named ThangLong-Hanoi project on Preservation of Historical Heritage and 1000th Anniversary Ce.ebration. This research includes study on historical transfiguration through urban dev lopment in Hanoi; Vietnam over 1000 years, this project is being carried out by Center for Southeast Asian Studies at Kyoto University. Study about historical site is very importance because of history of Thang Long-Hanoi is associated with history of sites. In this paper including knowledge about historical sites and it's usable for project work. And from other side collection of historical sources which is given by historical materials from differences sources with the statistic, investigation and etc.. Beside the big help of Information technology, Remote Sensing and GIS enhancement, information from many sources researched under advance information as the creation of thematic maps, historical map, land use land cover map, topographic map etc... with the time dimension thematic maps will be build in 4D space for Thang Long- Hanoi.

In the first step of Project, we collected 150 historical sites in Hanoi, with the help of some historical descriptions issuing by office of 1000th Anniversary Celebration and from other sources. In our experience study very detail of every importance historical site which will have a big support for study about Thang Long-Hanoi. Historical site can support good location for geo-references, support information for changes of place-name, administrative land, etc... and cultural heritage was existed and continue displaying the spirit, a tradition which are part of Thang Long heritage.

2. APPLYING HISTORICAL SITES TO STUDY HISTORICAL MAP

2.1 Historical Map and Historical material

Most historical GIS would be impossible without historical maps, historical document which noted information about geographic location and spatial information record the geographic information that is fundamental to reconstructing past places, where pagodas, temple, villages, town, region, or nation. But some problems are there in old historical maps, historical documents.

Historical maps: - Almost historical map had draw with simple estimate and calculate by ancient geologist there are no good accuracy

- Lack of detail in historical map, most of old historical maps are not enough information compare with the present historical maps.

Historical Material:

- Written source of ancient scientist
- Extraction, collection, research and written by expert in historical field and geography.

From both of sources, although there are not given exactly location as longitude, latitude and boundaries between the village, district etc...but from depiction we can use to verify and arrange vaguely location of the village, and historical sites

2.2 Methodology of Creating Historical map

More importantly for the aims of historical research, information that was difficult to perceive for our own investigation. We can now measure elevation, distance, and area, and rotate the image to place ourselves at different viewpoints. Ordinarily, the first step in preparing a paper map for use in GIS is scanning it. This purpose, it is best to capture map images at a very high resolution. If one's main purpose is to study map as historical documents. Scanned maps can be easily incorporated into a GIS as graphic images. Connected by hot links to particular features in a GIS layer, historical maps can be opened to compare present and past configuration of given place or landscape. Integrating historical maps in GIS to analyze the spatial information they contain, or to layer then with other spatial data, requires that the maps be geo-referenced. That is, select *control points* on a scan of the original map must be aligned with their actual geographical location, either by assigning geographical coordinates to each point, or by linking each point to its equivalent on a model accurate digital map. Once the control points are in place, one applies mathematics algorithm to warp the original map image to fit the chosen map projection as nearly as possible. Further adjustment can be done manually to try to find the best fit for all parts of original map. Because it stretches and shrinks the map image like a thin sheet of rubber being pulled to fit a particular form

2.3 Application for Study area

Historical maps are precious material, which show various spatial distribution of land use, streets and so on of the historical importance at the time the maps were produced; they may be a dependable source of information regarding concepts of city planning of the past. In analysis of historical maps, the most practical method is to compare them with the present ones, for instance, by overlaying them. However, the low precision, in the geometrical sense, of the historical maps

makes the task of comparison very difficult. So far, overlay historical map on present map has been done basically by hand. Such method, however, has following drawbacks:

(a) the work is not efficient

(b) original information on historical maps is lacking

(c) the method is not sometimes objective.

Study about historical site is very importance which can useful for discover distribution of the streets, villages, districts in ThangLong citadel because following estimate (Table 1): almost historical sites related with history of villages, country life, place for worship and so on.

Group of historical sites	Objects of the study about historical sites
Characteristics of times	Historical times, historical information
Places of worship of trade village	Times, identify relative sites locations, boundaries between trade villages in citadel
Sculpture Architecture	Time, historical information
Painting and casting arts	Time, historical information
French Architecture	Time, urban changes, urban developments
Historical was collapse	To protect, urban changes, comparing with previous times

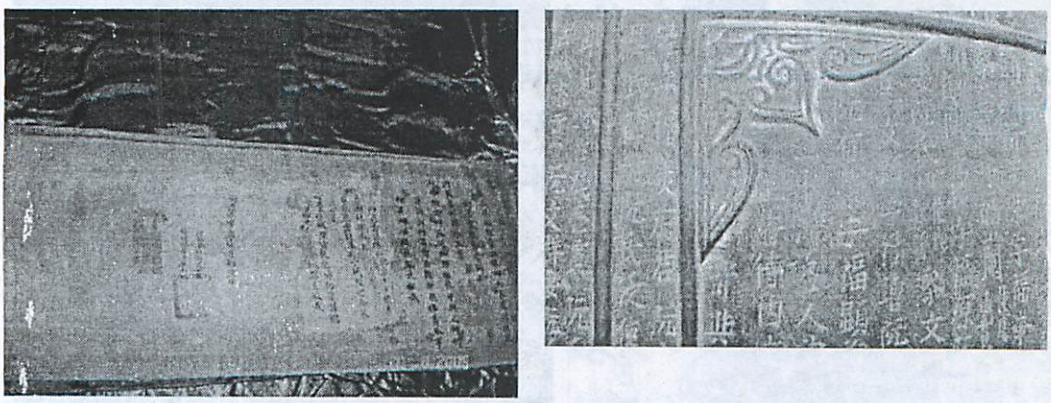

Fig 1. Original writing colleted in historical sites, Right image is Confer a title on Hoa Than Pagoda by King, Left image is letters were sculptured surround bell.

Fig 2. Van Mieu, Hoan Kiem Lake, HaNoi flag tower, typical and importance sites showing almost map, including ancient map,Le Dynastys Map in 1490, map of Hanoi 1873, etc..

2.4 Identification Historical site

To locate the historical site in the Map or Satellite images, normally we should know the location of that point or identify the situation of that point from shape, texture, knowledge about that point, etc. in fact to combine two methods are better, because form GPS instrument we can identify location with the accuracies which can be given by different GPS instrument accuracy, weather condition, space around the location where we took the coordinate of the historical site. And form satellite image we can check it up and change the location so that is suitable with the fact.

The problem of data collection in Hanoi, almost of the historical sites is inner the main city, with the many houses and building obstruct GPS instrument receiving and transmitting the signals. But with the high resolution we can identify the historical site from the image ex. Quick Bird Image with the 0.6 m resolution. More than haft of 150 historical sites in Hanoi which we have visited and observed we could identify by human eyes based on high resolution image However other historical site had not really good landscape to identify exactly location, in that case combine coordinate taken from GPS instrument, Satellite images and human who know clearly about study area can be help to decide which point in the map is location Fig3.

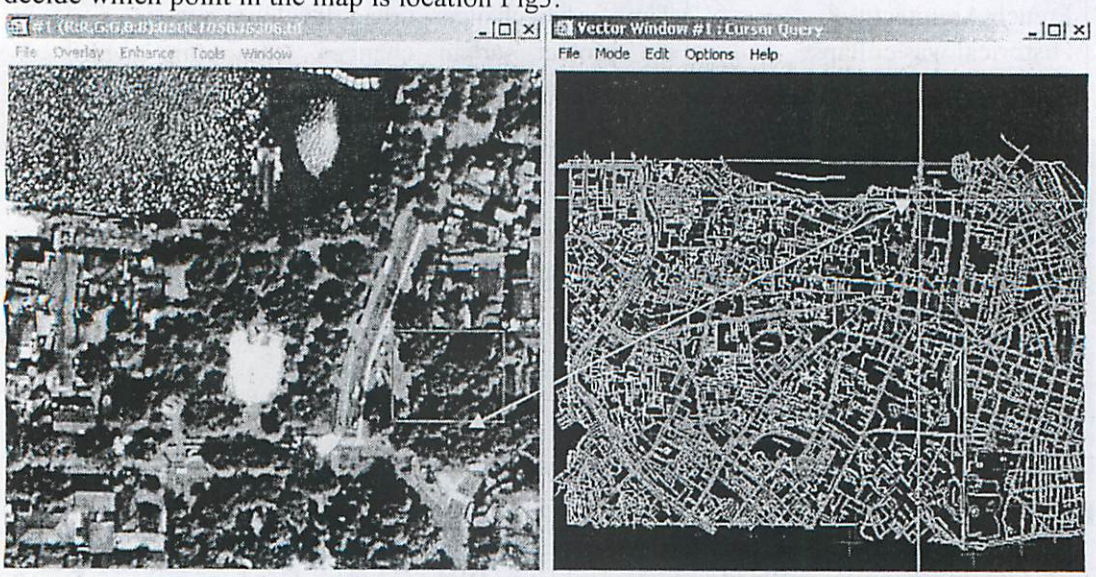

Fig 3: Left side is Quick Bird Image taken October, 2005, Right side vector data digitizing from left side image (Data taken from Prof. Shibayama and Prof. Venkatesh). Arrowhead in left and right are same point, inner the red triangle is historical site named Tran Quoc Pagoda, location given GPS in this case accurate's about 5 meters.

Input the GPS value which we have taken in the field had the location, some locations did not accurate with its real locations, Form Quick Bird data we can easily identify and correct almost. Some sites those have covered by houses and building, it is very difficult to recognize by Images, the combine of both methods are importance and useful

3 DATA MODEL FOR HISTORICAL MAP

3.1 Creation of records in the Database

Records in the relational database are also linked to geographic objects in GIS, in other words, for each record there are associated spatial objects in GIS layers which can be used to represent the historical places on digital map.

To accomplish this task, we had to clearly define what constitutes an historical administrative unit of the historical site and historical information description. According to the basic requirements for the study, there were three primary types of change to be recorded in the database:

Change in name places
Change in administrative type
Change in location, area, or boundary.

In *our records* the three core elements for each historical place in the main table, to which a new row is added whenever one of the three core elements change. For our purposes each row is called an historical instance and is defined as a record with the period of time during which the place name, future type, and spatial object all remained unchanged, lasting from a specific begin date to specific end date. Should any of these three attributes change, a new record is added to the database. In the Table2 we show actual records from us database. Each of these records constitute a single *historical instance* and have their own unique ID number.

Name_roman	Chinese_transcribe Vietnamese	Type	Begin_yr	End_yr	Unique_id
Den Dong Huong	No data	Point	Le Dynasty	Nguyen Dynasty	100201
Den Dong Huong	No Data	Point	Nguyen Dynasty	1954	100202
Den Hai Ba Trung	No Data	Point	1142	1819	101301
Den Hai Ba Trung	No Data	Point	1819	1954	102102

Since the place name and future type are identical for all two instances of Dong Huong Temple, We need to provide some more information about what constituted changes. To do this the records in the main table include a year of changes.

Begin_yr	Begin change type	End_yr	End change type	Unique_id
Le Dynasty	Place name changed	Nguyen Dynasty	Administrative area change	100101
Nguyen Dynasty	Administrative area change	1954	End of database cover period	100102

From these columns we can now see that the first record for Dong Huong Temple appears in Le Dynasty, its name was changed in Nguyen Dynasty. In 1954 year the district where Hang Trong Temple was laid in was changed by administrative location's name.

3.2 Relation of the historical sites and boundaries

In most case, the geography of administrative units in our studies is defined in two ways: by the area over which they have jurisdiction, and situation of historical site changes. Using GIS technology it is possible to define both a polygon (to represent the area of jurisdiction) and a point (to represent historical site name) for single record. We found that boundary changes and changes of historical site situation some time occur at the same time and almost do not occur at the same time. In addition, these and other factors forced us to keep track of the area if

jurisdiction and the historical site situation for many particular historical place as separate objects in separate GIS layers.

Name_roman	Beg_yr	End_yr	Boundary_id	Point_id
Den Dong Huong	Le Dynasty	Nguyen Dynasty	100101	1001
Den Dong Huong	Nguyen Dynasty	1954	100102	1001

Some cases get the both of the changes: location changes and boundaries changes example Hai Ba Trung Temple was moved from Dong Nhan alluvial to Vo Mieu, Huong Vien, Tho Xuan district because of the flood making effect in 1819. In this case both location and boundary were changed.

Name_roman	Beg_yr	End_yr	Boundary_id	Point_id
Den Hai Ba	1142	1819	101301	1013
Den Hai Ba	1819	1954	102102	1021

4. POTENTIAL INFORMATION EXTRACTION FOR HISTORY IN THANG LONG - HANOI

Information Extraction (IE) is the name given to any process which selectively structures and combines data which is found, explicitly stated or implied, in one or more texts. The final output of the extraction process varies; in every case, however, it can be transformed so as to populate some type of database. Information analysts working long term on specific tasks already carry out information extraction manually with the express goal of database creation. One reason for interest in IE is its role in evaluating, and comparing, different Natural Language Processing technologies. Unlike other NLP technologies, MT for example, the evaluation process is concrete and can be performed *automatically.* This, plus the fact that a successful extraction system has immediate applications, has encouraged research funders to support both evaluations of and *research into IE.* It seems at the moment that this funding will continue and will bring about the existence of working systems. Applications of IE are still scarce. A few well known examples exist and other classified systems may also be in operation. It is certainly not true that the level of the technology is such that it is easy to build systems for new tasks, or that the levels of performance are sufficiently high for use in fully automatic systems. System was prepared to provide a fully documented database of *historical administrative units in ThangLong* Records in the relation database are also linked to Geographic GIS. In other words, for each record there are associated spatial objects in GIS layers which can be used to represent the historical places on a digital map.

From many difference sources associating with advantage of rapidly develop information technology, creating the special system which support for historical study to extract requirement information form historical sources is probable.

5 CONCLUSION

This report has principally introduced the potential of the using historical sites in study *Thang Long*-Hanoi Project on preservation of Historical Heritage. Focus of this report is theory and some small application, but with the cooperation and support from Japan-Vietnam Geo-informatics Consortium, Center of Southeast Asian Studies, Kyoto

University, Japan etc... and all people who have worked with us, we hope that Vietnamese will have earliest the Thang Long-Hanoi with another views promoted the Thang-Long by area studies, informatics, to preservation Thang Long-Hanoi history and culture.

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SPATIOTEMPORAL MAPPING OF CULTURAL HERITAGE IN HANOI CITY

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ABSTRACT

Informatics will provide area studies with new approaches and knowledge, so researchers need to lead the way to further development of informatics through its application to area studies. In order to amalgamate both area studies and informatics, Center for Southeast Asian Studies at Kyoto University are working on creating and building up a new discipline "Area Informatics", and has started new project "Development of Area Informatics" as 5 years project (Shibayama, 2005). One of core studies in the project is "Thang Long - Hanoi Project on preservation of historical heritage and 1000th anniversary celebration" (Shibayama, 2005). In this research, a study on historical transfiguration for urban development in Hanoi of Vietnam for 1000 years is to be carried out, so that the digital preservation and restoration based on the studies can be opened to the public via the Internet. As well as the historical studies, it aims at the digital archives for preserving the Thang Long - Hanoi vestige site and the historical heritage. In order to make progress in the historical analyses, building thematic map in 4D space with collecting the feature data which includes GPS position has been carried out.

This paper provides an outline and details of case study on preservation of the Thang Long - Hanoi archeological site and historical heritage.

1. DATA COLLECTION FOR HANOI

To collect various kinds of fundamental data for the research is extremely important to push forward the research of history at Hanoi Project and the city transfiguration. Table 1 shows the collected data which were created from collaboration with Hanoi University of Mining and Geology, VAST and Vietnam National University Hanoi in 2005. It consists of the items of historical and cultural sites (150 sites) and 3D animation for 2 points. To comprehend a process of city transfiguration, the collected data have a sort order, under French rule, before it or before 1945 as shown in Table 2. Those are mainly composed of historical map, topographic map, vector image, satellite image, aerial photo and cadastral map. Also, Prof. Sakurai's group carried out a field survey in Hanoi to correct the inscription data (over 60 points) in August, 2006. And Dr. Ota carried out a survey to correct a Hanoi map in French library.

Table 1. Historical GIS Data Collection for Hanoi (2005).

A. Historical and Cultural Sites: 150 Sites	
Items	(1) SITE ID. (2) SITE Name (3) Place Name and Local Name (4) Latitude (5) Longitude (6) Topographic Elevation (7) Historical Time period (8) Description of Spot (9) Historical and Architectural Significance (10) Reference documents list (11) Still Picture (12) Motion picture
B. 3D Animation for 2 Points	
Items	(1) SITE ID. (2) SITE Name (3) Place Name and Local Name (4) Latitude (5) Longitude (6) Topographic Elevation (7) Historical Time period (8) Description of Spot (9) Historical and Architectural Significance (10) Reference documents list (11) Computer Animation

Table 2. Resources for Historical Mapping and Overlaying.

A. Historical Maps
(1) Years: 1873, 1886, 1898, 1915, 1925, 1936, 1942, 1968, 1980, 2000 (2) Scanned and Picture Maps(Raster Image)
B. Topographic Maps
(1) 1:5000 Topographic Map (2) Digitalized Numerical Maps (Vector Data)
C. Satellite Images:
(1) IKONOS 1m Resolution, Central Hanoi (2) QuickBird 0.6m Resolution, Central Hanoi
D. Aerial Photos: Williams Hunt Collection
E. Land Owner and Cartographic Data : 168 Villages

2 CREATING OF HANOI DIGITAL MAP

It is necessary to generate a digital vector map as a basis for mapping of data in Chapter 1. In this project, we generated a digital map 2000 in Hanoi by QuickBird basically as follows;

1) Vector format: ESRI Shape files with Coordinates
2) Coordinate system: Datum: Ellipsoid WGS 84, Datum WGS 84, Projection: UTM zone 48 N
3) Scale: 1:2000, (Source: QuickBird image resolution: 0.6m, format: geotif RGB fusion)
4) Map layers: Roads, Road centerline, Building blocks, Landmarks, Lakes and Ponds, Rivers and Water channels, River and Water channel centerlines

The result of the generated digital map is shown in Figure1. Back image is shown by QuickBird (2005), and front vector data represent road, river and water channel in Figure 1.

Figure 1. Digital Map 2000 *in Hanoi.*

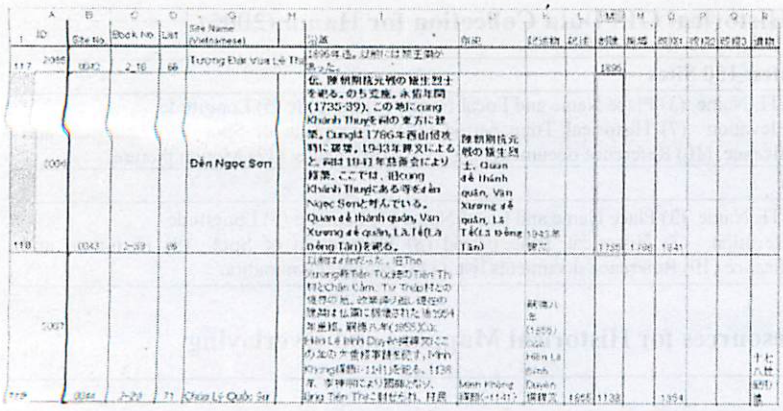

Figure 2. Example of historic places or archeological site data (150 points).

Table 3. Historic places and archeological sites distribution (Total:132).

Year	< 1000 <	< 1200 <	< 1400 <	< 1600 <	< 1800 <	< 2000
Number	9	18	7	18	35	45

3. MAPPING OF HISTORICAL HERITAGE AND FRENCH ARCHITECTURE

The result compiled the historic places or archeological sites (i.e. temple, pagoda etc.) are shown in Figure 2. In order to make spatiotemporal expression possible, we have to expressly set up the factors of representing time axis in Figure 2. Therefore we derived the established age from historical description, and shows in the *M* field to make it define the established age. The data of 132 cases of historic places and archeological sites distribution separated by age are shown in Table 3 except for deficiency data. We devise ways of displaying French architecture by Web browser as shown in Figure 3. Note that this paper does not cover the details of such data. Figure 4 is a displayed example overlaid QuickBird image and digital map 2000. In Figure4, TimeMap is introduced as the browsing implementation of spatiotemporal data. TimeMap allows us to search and display data by specifying time factor with Time Scale Bar under the map displayed screen. Time Scale Bar enables to search and display n-years data ($a \leqq n \leqq b$) by specifying the starting year a and ending year b of searching or displaying respectively. The starting year a of searching or displaying during n-years can be slid and specified in a range of e ($s + n$).

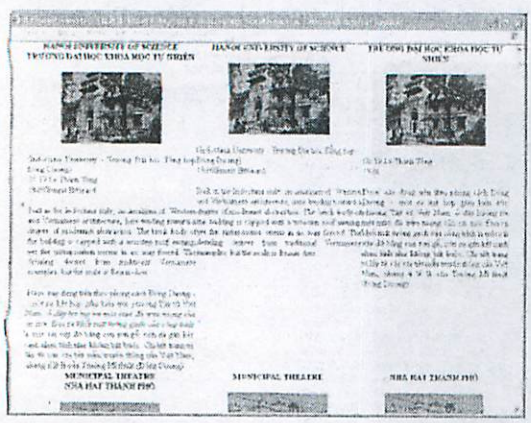

Figure 3. Displaying French architecture.

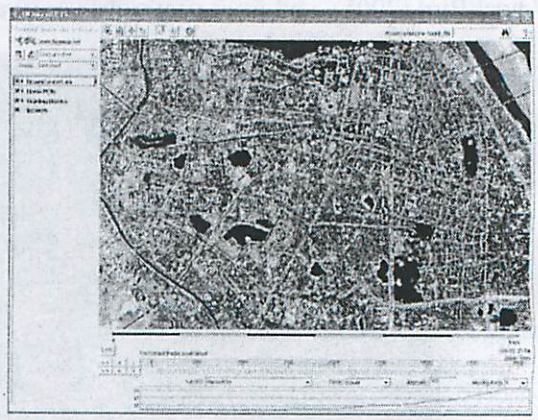

Figure 4. Example of overlaid QuickBird image of digital map 2000 using TimeMap.

Figure 5. Village Map in Hanoi 1973.

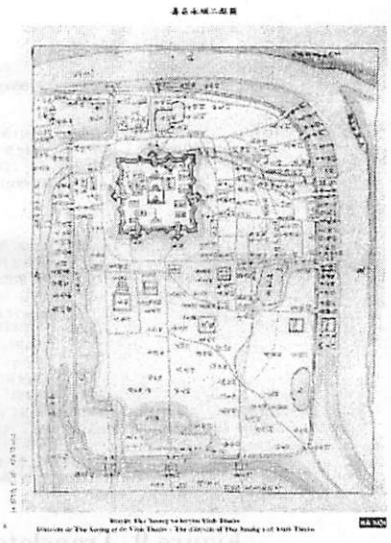

Figure 6. Ancient villages Map.

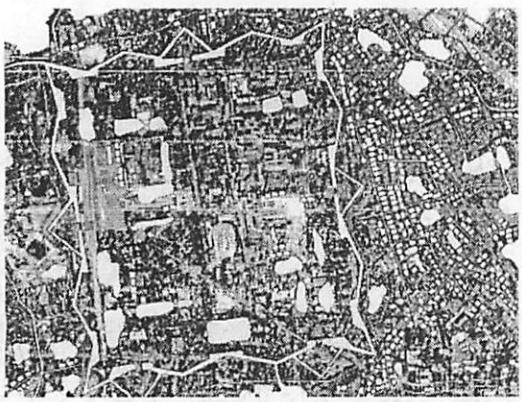

Figure 7. Result of overlaid vector digital map 1873 on IKONOS satellite image.

Figure 8. The contents of register of title deeds in Hanoi.

4. MAPPING OF ANCIENT VILLAGES

About ancient villages, Prof. Phan Huy Le published the data (168 villages) of Cadastral Map in Hanoi (Phan, 2005). Based on his data, we make an attempt to research the city transfiguration with overlaying the generated digital map 2000 and satellite image. The basis of this data, picture map 1973 is shown in Figure 5. Regarding to mapping of ancient village based on Cadastral Map in Hanoi, it is shown in Figure 6. However it is difficult to gain an understanding of location in ancient villages as shown in Figure 6. Then we try to understand the village distribution in visualized way by overlaying of the satellite image and the data of ancient villages in 1873. Figure 7 is result of overlaid vector digital map 1873 on IKONOS satellite image by adjusting a location-standard to South point of Tay Lake. Consequently the distribution of ancient villages in 1873 can be compared with the present village.

	A	B	C	D	E	F	G	H	I	J
1		府(phủ)/縣(huyện)			総(tổng)/區(khu)	坊(phường)/	東(Đông)	西(Tây)	南(Nam)	北(Bắc)
27								本総東寿(Đông Thọ)村民居に接し、本村民居ba		
28		寿昌(Thọ Xương)縣	1	13	東寿(Đông Thọ)総	望河(Vọng Hà)村	(Cựu Lâu)村寺地、lũy tre xanh(青竹塁?) 東安	該村に村固、湖岸沿い(dọc theo bờ hồ)の本村	Tả Vọng村 本総旧楼(Cựu Lâu)村寺土 lũy	籍田、籍田に、東安(Yên)村地分、cửa cống(
29							安忠上(Yên Trung Thượng)村公土に接し、す			
30		寿昌(Thọ Xương)縣	2	1	同春(Đồng Xuân)総	古梁(Cổ Lương)村	大川に接し、川を界とする	(Thanh Hà)村、香牌(Hương Bài)村民居に接し、又、官路に接し、対岸向こう側は本縣香義	本縣香義(Hương Nghĩa)村、香牌(Hương Bài)村民居に接し、又、蘇瀝(Tô Lịch)江と官路	阮下(Nguyễn Khiết Hạ)民居に接し、又、本村民対岸の官路に接し、本村民の地・家と、神祠・民
31							本縣香義(Hương Nghĩa)村、東寿(Đông Thọ)村民			
32							官路に接し、対岸は?(đối ngạn)本村民居、本村Trần			
33		寿昌(Thọ Xương)縣	2	2	同春(Đồng Xuân)総	同順(Đồng Thuận)村	大羅城路 本総花門(Hoa Môn)村、同春(Đồng Xuân)坊地分に接し、又 cửa cống(貢口?) 官路に接し、対岸向こう側は永綏(Vĩnh Trù)村、府祠(Phủ Từ)村村地分、城壁、小路、花門	外城壕 前中(Tiền Trung)村、安富(Yên Phú)村、清河(Thanh Hà)村地分に接し、又 官路に接し、対岸は安富(Yên Phú)村地分、清河(Thanh Hà)村の石柱・??、本村結界?い	本総清河(Thanh Hà)村、Hoa Môn村、安富(Yên Phú)村、府祠(Phú Từ)村、順美(Thuận Mỹ)総東成市(Đồng Thành Thị)村地分に接し、又、官路、蘇瀝江に	外城壕 本総前中(Tiền Trung)村地分に接し、又 蘇瀝(Tô Lịch)江、官路に接し、対岸向こう側は安富(Yên Phú)村、永綏(Vĩnh Trù)村民居、永順(Vĩnh Thuận)縣槐街(Hoè Nhai
34		寿昌(Thọ Xương)縣	2	3	同春(Đồng Xuân)総	同春(Đồng Xuân)坊	本総玄天(Huyền Thiên)村、義立(Nghĩa Lập)村、前中(Tiền Trung)村地分に接し、又 官路に接し、対岸	本総同順(Đồng Thuận)村、府祠(Phủ Từ)村、花中(Hoa Trung)村地分に接し、又 官路に接し、対岸	本総花中(Hoa Trung)村、永亭(Vĩnh Hanh)坊、玄天(Huyền Thiên)村地分に接し、本坊籬を	官路に接し、対岸は永順(Vĩnh Thuận)縣上(Thượng)総槐街(Hoè Nhai)坊地分、半官路を

Figure 9. Translated register of title deeds in Hanoi.

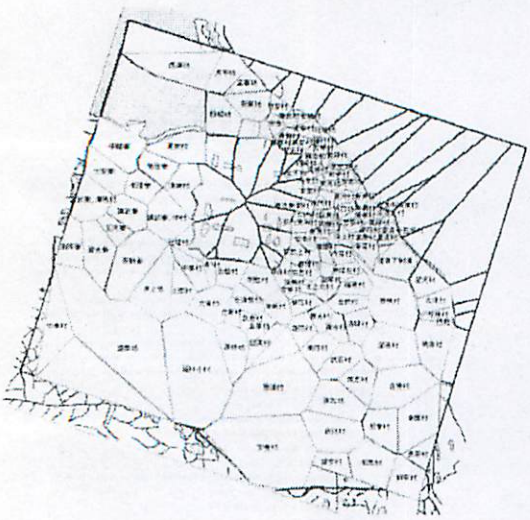

Figure 10. Voronoi Diagram of villages area of influence.

Figure 11. The ancient villages overlaid on digital map in 1973.

The contents of register of title deeds in Hanoi are shown in Figure 8. This content is translated from Vietnam into Japanese and arranged the information in table form as shown in Figure 9. The ancient villages are drawn approximately in the digital map in 1873 based on Figure 8. Then the Voronoi Diagram of area of influence is drawn in Figure 10. The area of ancient villages and adjoining relation can be estimated by using the Voronoi Diagram. Furthermore, the ancient villages are overlaid on digital map in 1973 to look into the relationship between the distribution of villages in 1873 and each village. The result is shown in Figure 11. It can be recognized the fluctuation of each of village by using Voronoi Diagram. It is not possible to say that the assumption of the adjoining relation is totally accurate, so the register of title deeds in Figure 9 was used to estimate correctly the adjoining relation of ancient villages based on Voronoi Diagram. The name of ancient villages that extracted from Cadastral Map are visualized by graph algorithm. The result is shown in Figure 12. It enables to weigh the data by overlaid this result, Figure 10 and Figure 11. In addition, it can be estimated the adjoining relation or location of ancient villages and also derived the area or degree of location of villages.

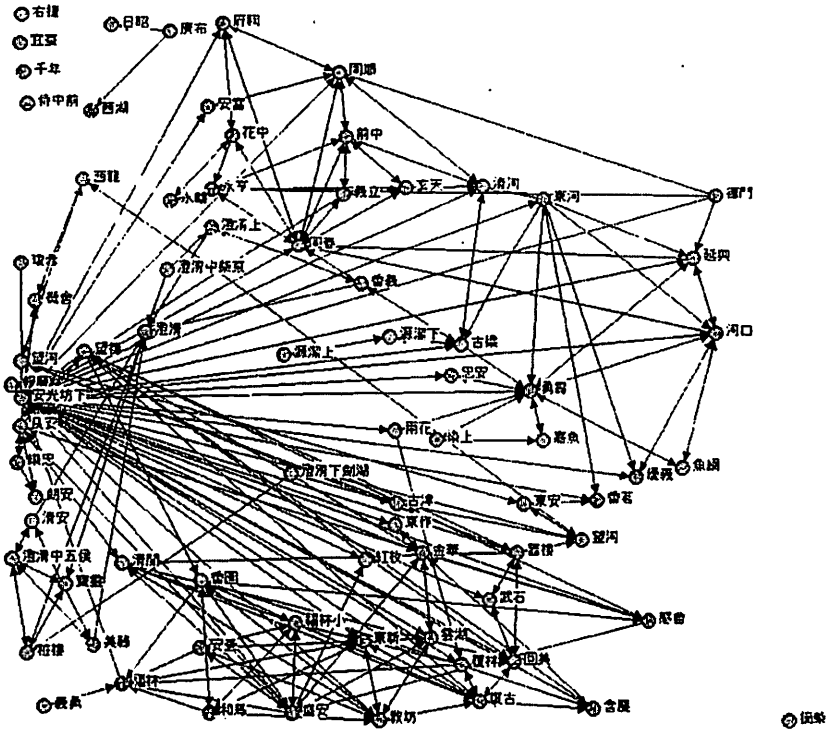

Figure 12. Example of graph for adjoining relation of ancient villages.

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