VIETNAM ACADEMY OF SCIENCE AND TECHNOLOGY

Annual Report 2012

Hanoi – 2013

Preface

This brochure is the annual report 2012 of the Vietnam Academy of Science and Technology (henceforth abbreviated to VAST). It presents main activities and distinguished achievements of VAST and provides the readers with an overview of VAST in the year 2012.

Annual activity report (Annual report) is a document written using general standard of the research institutes around the world to help partners, especially foreign partners, the management agencies to better understand function, task and development orientation of VAST to strengthen cooperation.

The Editorial Board thanks scientists, staff and subordinate institutions of VAST for their help and support during the preparation of this brochure. Any comments or feedback is welcome.

Table of content

1. Introduction 5

1.1. Organization of VAST 5

1.2. Function and mission of VAST 6

1.3. Directorate of VAST 6

1.4. Particular situation in 2012 6

2. Research activities in the year 2012 7

2.1. Fundamental research in Mathematics and Physics 7

2.2. Information Technology, Automation, Electronics & Space Technology 11

2.3. Biotechnology 17

2.4. Material Sciences 21

2.5. Biodiversity and Biological active substances 26

2.6. Earth Sciences 27

2.7. Marine Science and Technology 32

2.8. Environmental technology and energy 35

3. Technology Applications and Deployment 37

3.1. Development and Application project cooperate with provincial, ministries 37

3.2 Pilot production project 37

3.3. Unscheduled scientific mission for local 38

3.4. Develop the application program in national and regional scale 38

3.5. Cooperation with provincial, ministries 38

3.6. International cooperation on technology application 39

3.7. Techmart 39

3. 8. Scientific - Technical Services Contracts (without the State Budget). 39

3. 9. Intellectual property activities 39

4. Education and training activities 39

4.1. Results of postgraduate training achieved in 2012 40

4.2. Human Resource training activities 41

5. International co-operation activities 42

6. Activities of Key Laboratories at VAST 45

7. Publishing, Museum and Information activities 48

7.1. Publishing activity 48
7.2. Museum activity 50
7.3. Information activity 54
8. ODA-funded satellite projects 55
8.1. The project "Vietnam natural resources, environment and disaster monitoring small satellite- VNREDSat-1" 55
8.2. The 2nd project for natural resources, environment and disaster monitoring satellite (VNREDSat-1B): 56
8.3. Vietnam Space Centre Project 57
9. Investment to strengthen research capabilities and technology deployment 60
9.1. Present Infrastructure and facilities of VAST 60
9.2. Results of investment on facilities construction in 2012 61
10. Some important statistics 63
10.1. Statistics on Human Resources 63
10.2. Statistics on finance, scientific publications and education 66
11. Orientations and plans for the year 2013 70
11.1. Deploy Scientific and Technological tasks 70
11.2. Undertaking the tasks of investing and building scientific and technological resources 75
11.3. Regular works: Personnel and training, financial plan management, information - publishing, international cooperation 76
11.4. State budget Estimate in 2013 78

1. Introduction

1.1. Organization of VAST

1.2. Function and mission of VAST

According to the Decree No. 62/2008/ND-CP signed on May 12, 2008 by the Prime Minister, VAST is an organization directly belonging to the Government. VAST carries out fundamental research in natural sciences and performs technology development with the focus on national priority targets, with the aim of providing scientific basis for the management of science and technology, and for the making of socio-economic policy, strategy, planning, and the training of human resources of high scientific and technological qualifications according to the laws.

1.3. Directorate of VAST

- President: Prof. Chau Van Minh
- Vice-Presidents:
    - Prof. Nguyen Dinh Cong
    - Prof. Duong Ngoc Hai

1.4. Particular situation in 2012

Year 2012 was marked an important year in the development of VAST, the first year of implementation of the "master plan for development of the Vietnamese Academy of Science and Technology 2020, with a vision to 2030" has been approved by Prime Minister in late 2011.

On 25/12/2012, VAST has been approved by the Government Decree 108/2012/ND-CP, replace Decree 62/2008/ND-CP, defining the functions, tasks, powers and organization structure of the Vietnam Academy of Science and technology. The changing to the Vietnam Academy of Science and Technology, along with specific contents stated in the decree demonstrate strategic vision, right to the functions and tasks of the Vietnam Academy in order to improve performance, set central political tasks assigned by the Party and State in the period of accelerated industrialization, modernization and rapid development, the country's sustainability, consistent with the position, functions, duties and organizational structure of the Vietnam Academy in the new situation. This is all effort of the Vietnam Academy and the Government and the industry recognized.

VAST efforts and complete tasks of scientific research and technology development proposed in 2012. VAST implemented Resolution 01/NQ-CP dated 03/01/2012 of the Government on the key measures of direction and implementation plan of socio-economic development and estimated state budget in 2012. Development of science and technology associated with the practice, emphasis on product quality of science and technology. VAST prioritized resources to carry out high-tech development programs (such as space technology, biotechnology), to encourage the registration of intellectual property, support the application and transfer of scientific technology, enhanced international cooperation.

In the past year, VAST has established a new Institute of Gene System Research and the Institute of Ecology in the South continue the step-by-step guidelines to mount scientific activities of VAST technology with the demands of the locals, regionals. Currently, VAST has 49 units including 25 national research

institutes, 01 national research centers; 03 national business units; 07 functional units help President; 08 research institutes and 03 business units established by the President of VAST.

2. Research activities in the year 2012

2.1. Fundamental research in Mathematics and Physics

Fundamental research in Mathematics

The current staff of the institute consists of 79 research members and 17 administrative officers. Of which there are 17 professors and 12 associate professors, 15 Doctors of Science and 30 PhD.

The staffs of Institute implement 26 tasks under Fund for supporting the development of science and technology countries (NAFOSTED), 01 task with direction of science and technology priority and 01 independent task for young researcher VAST level. In 2012, the researchers of the Institute have published 65 papers in international journals and 06 national journals in English of which 34 and 21 papers are in SCI and SCI-E respectively. Good results were achieved in Algebra, number theory, differential equations, calculus and scientific calculation, Optimization and Control.

The current number of PhD students is 27, among them 3 has defended their theses in faculty level this year. These theses have published papers in international Journals. The institute has two master programs, an ordinary Master Program and an international Master Program. The total number of students of these master programs is 133 persons of which many of them got scholarship for studying abroad. The institute also organized a summer school for 100 mathematics students coming from 15 universities all over Vietnam and a regular club for high school students gifted in mathematics in the area around Hanoi.

The Institute organized 07 conferences and workshops, including 04 international conferences with the participation of nearly 300 foreign scientists in 2012. Besides, the Institute also received 10 international visitors to the work and teaching. At present the Institute has 04 researches collaborated with French and international cooperation with Japan on singularity theory, with Russia on Differential Equations and the United States of vibrational calculus. There were 53 staffs working abroad (in the conference, scientific exchanges, internships, training). Many staffs of the Institute participated teaching regularly mathematics for students in training centers all over the country.

The biggest problem exists is not recruiting enough young workers to replace the retired officers. Some traditional research directions of the Institute are gradually eroded. The application of mathematics is not development. Mathematics Institute is actively recruiting and has many policies supporting young staff on work at the Institute. To be able to work effectively attract qualified research staffs, Institute of Mathematics needs the support of operating funds and construction funds to improve living and working conditions.

Fundamental research in Physics

The research activities and achievements in physics at VAST have been substantially developed. There are currently more 70 scientific projects in Physics that have been funded by NAFOSTED and coordinated by the physicists of VAST, this project number increased by more 17 % in comparison with 2011. Particularly, some research projects in Physics have been started in 2012 as VAST issued the decisions (474/QD_KHCNVN signed on 23/April/2012; 1376/QD_KHCNVN signed on 3/Oct./2012; and 1379/ QD_KHCNVN signed on 3/April/2012) to financially support young scientists in carrying out scientific research. Nearly 60 % of the research projects in physics at VAST have been coordinated by young physicists. In 2012, the VAST physicists published more than 260 refereed papers (among them 115 publications in international journals).

The researches in physics have covered basic research including theoretical physics, computational physics, condensed matter physics, nano-materials sciences, nuclear physics, optics and photonics, applied physics, physical engineering and development activities in priority fields of technology…

Regarding the researches in theoretical physics and computational physics:

Beside traditional directions of research such as quantum field theory, high energy physics and solid-state physics, some new directions of research are very highly evaluated such as Quantum information, Computational physics and Biophysics... Therefore, publications increase substantially and the VAST physicists in the fields are making a leading role in international publications. In 2012, they published 44 scientific papers in SCI and SCI - E listed journals. The research projects concern to:

- Modeling of biomolecules and biological complex systems.
- Theoretical study of quantum information.
- Electron correlations in emergent and nonequilibrium properties of the advanced materials models.
- Violation of lepton and baryon numbers in particle physics and application to cosmology.
- Flavor symmetry and neutrino physics.
- Magnetic and transport properties in strongly correlated electronic systems.
- Theoretical models and some applications of nano, quantum, bio systems.

- Scattering mechanisms for two-dimensional carrier systems in ZnO and group III nitride based heterostructures.

Regarding the research in nuclear physics:

The research activities in nuclear physics have been carried out by the physicists at IoP, VAST under effective and fruitful cooperation with international research centers, such as Dubna (Russia), ORSAY (French), POHANG (R. Korea), RIKEN (Japan). The scientific projects cover:

- Study of nuclear reactions with complexity mechanisms induced by bremsstrahlung and photoneutrons generated from electron accelerators with energies from 15 MeV to 2.5 GeV.
- Investigation of Exotic nuclei using accelerators.
- Study photonuclear reactions and charge exchange reaction at accelerators.
- Microscopic study of nuclear structure at high temperature or excitation energy.

The scientific results and papers published in nuclear physics continuously increased.

Regarding to the researches in condensed matter and materials physics:

Almost the research activities have been carried out at Institute of Physics, IOP in Ho Chi Minh city, Institute for Applied Materials Science and, in particular, the Institute of Materials Sciences based on the National Key Laboratory of Electronic Materials and Devices. It is mentioned that the number of projects activated in condensed matter and materials physics is more 60 % of the projects in physics at VAST and funded by NAFOSTED. Therefore, publications in the fields of the VAST physicists increase substantially. In 2012, they published 146 refereed papers (among them 65 papers in ISI listed journals).

The research projects concern to:

- Investigation of physical properties ZnO, $Mg_xZn_{1-x}O$ film prepared by Metal Organic Chemical Vapor deposition (MOCVD).
- Quantum simulation of electronic excitation spectra and transport in nanostructures.
- Study on nanostructure materials and environment ecology problems by simulation method.
- Theoretical study of electronic properties of graphene nano-structures.

- Many-particle correlations and ultrafast nonlinear optical response of quasi-two-dimensional semiconductor nanostructures.
- Investigation of Electronic Structure and Properties of Low-dimensional Semiconductor Systems.
- Quantum simulation of electronic excitation spectra and transport in nanostructures.

Regarding to the research in quantum electronics, optics, photonics and spectroscopy:

In the research direction, almost investigations have been carried out at Center for Quantum Electronics, IOP and Division of Optics and Spectroscopy (IMS). Some of these scientific projects are of potential application. In 2012, 02 patents of photonics and laser were issued to the physicists of IOP. These research projects concern to:

- Nano structural interactions in Multifunctional Composant for Biomedical Application.
- Photonics in study of interactions of biomocules using nano materials as cellular biomarker, applied for cancer diagnostics and therapy.
- Physics of the interaction between nano-gold particles and organic dye centers and the application to generate short pulse laser.
- Physics and Technology of all solid state lasers pumped by diode laser.
- Generation of ultrashort UV laser pulses basing on non-linear optics.
- Solid state Raman lasers.

The VAST physicists organized the 7th International Conference on Photonics and Applications (ICPA&). The ICPA meeting that is organized in Vietnam every 02 years has been a very important event of the photonic R-D activities in the region. It attracts many foreign scientists from Australia, French, Germany, Japan, S. Korea and the regional countries, and more 230 Vietnamese participants. As ICPA rules, some distinguished scientists in the world were invited to give invited talks at the ICPA7 Plenary Session to present the newest advances and achievements in optics, photonics and their applications, and particular new techniques, instruments as well as new research problems based on nana-photonics, bio-Nan photonics, bio-medical physics, photonic materials & devices … Some cooperation projects and links in scientific R-D and training have been initiated between Vietnamese institutions and international laboratories. The ICPA-7 meeting has a great success.

In 2012, the physicists of VAST organized successfully 02 international conferences, 02 national conferences and 03 international physical colleges. At Institute of Physics, the number of current PhD students is 41 and the number of current master students is 141. New international collaborations have been established between the physicists of VAST with science and technology institutions of around the world. They have been expected to enhance scientific research and training activities, and achievements in Physics at VAST

Finally, it must be noted one very important event to Vietnam physicists is that the Government issued the decision of implementing Development Strategy of Technology and Science from 2011 to 2020 (No 418/QD-TTg signed by Prime Minister Nguyen Tan Dung on 11 April 2012. There, the direct missions were set to Vietnam physicists to be to advise the government and implement Program for Development of Vietnam Physics to 2020.

2.2. Information Technology, Automation, Electronics & Space Technology

2.2.1. Information Technology and automation

In the framework of the project "Research and Develop the air environmental monitoring system remotely via mobile phone network" has mastered the design and manufacture the monitoring systems of air environmental parameter such as CO, CO2, CH4, NOx, SO2, temperature, air humidity, fire alarm signals, smoke detectors, and locate the area measured from the GPS module and transfer the information through the mobile network to the server with wireless technology such as GSM/GPRS. This information performs with digital map technology, measured parameters of air environmental on the advanced database management system and Web 2.0 technologies. The air environmental monitoring system can useful in a number of areas: environmental monitoring of air, storage warehouses, etc.

The system model is built according to the following structure:

- The ES-DATACOM devices: collect multi-channel air environmental data. The devices can integrate the sensors to measure the temperature, humidity, gas concentration: CO, CH4, CO2, SO2, NO2, etc.
- The center server monitors. SCADA software*:* the system of monitor and control (integrated digital map technology) on the server.

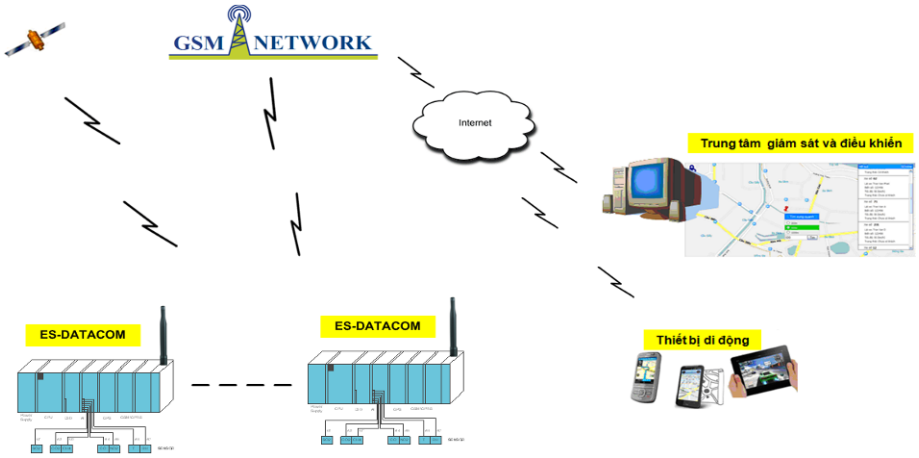
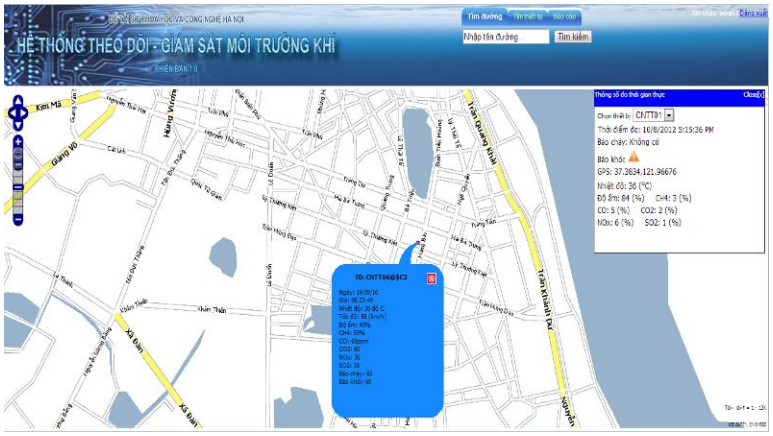


Illustration model of environment distance monitoring using GSM/GPRS

- The Multi-channel data acquisition device ES-DATACOM: The ES-DATACOM devices are capable of collecting data with the measure sensors of temperature, humidity, gas concentration such as CO, CH_4, CO_2, SO_2, NO_2, and flexibility with industrial communication standard. The capabilities of locating GPS potition and transmitting data in packets over GPRS with TCP/IP protocol, make the ES-DATACOM highly dynamic.
- SCADA software to monitor and control:
  - Connect to the data collection station of air environmental parameters through the mobile phone network GSM/GPRS.
  - Monitor the air environmental parameters with the intuitive digital map interface on mobile phones or desktop PC.
  - Warning whenever the air parametter reach or exceed a certain threshold.
  - Provide query data for LBS service.



WEB main picture in the centre of monitoring and control

In the framework of the National Project KC01.03/11-15 "Develop the Vietnamese – English and English – Vietnamese Speech Translation system on specific domain". The purpose: to master the core technology of speech translation,

focus on two directions: Vietnamese – English, English – Vietnamese, then to enlarge the ability for other language couples. Some initial results highlight:

-The application of speech translation for English-Vietnamese and Vietnamese-English on Android OS: The application for Android smartphone, based on three concatenating engines on each translation direction, as the Vietnamese to English Translation: (1) recognize speech (Vietnamese speech to text); (2)Machine Translaton (MT – translate to English text); (3) synthesize speech (English text to speech). This product achieved GoldCup Techmark 2012.

-The "Vietnamese News Reading Assistant" system: The system convert the website (i.e. electronic newpapers) into voice-based website automatically, accurately and rapidly, thereby providing users more convenience.

- The products are divided into two distinct approaches, but support and complement. One approach is free for users to interact with every website as voice-based website on PC and smartphone. The other is to support business with much more features as the synthesis quality improvement tools. This product won the second prize (highest) Vietnamese Talent 2012 competition. At the same time, base on these products, we have established *iSolar* group, in the high-tech business incubators, in the Hoa Lac Hi-Tech Park.

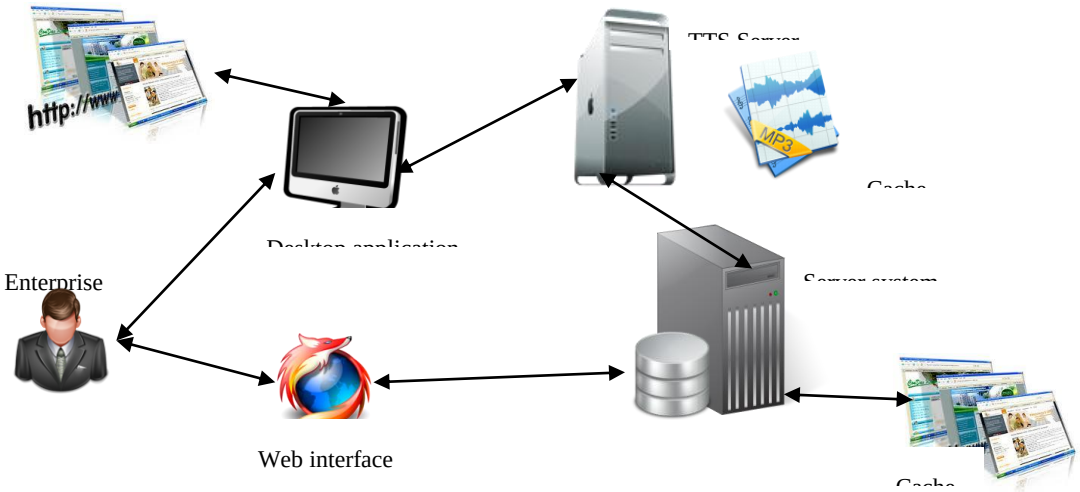


Illustration of the system for the Enterprises

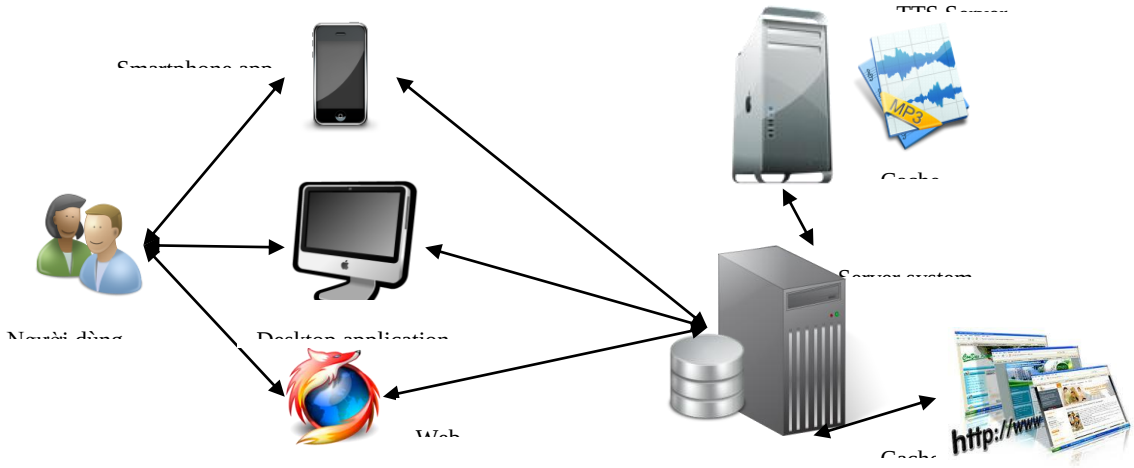


Illustration of the system for Users

2.2.2. Electronics

A research group (led by MS. Trinh Dinh Trung and MS. Trinh Ngoc Dieu) at Center for Physical Engineering, IoP has designed and manufactured successfully a device to re- improve the quality of the filters used in artificial kidney machines. Such treatment of the filters can be done automatically and programmable with the device. It must be noted that the filters of artificial kidney machines are rather expensive, but their lifetime is short, and therefore, highly consummated (due to more 70 000 patients in Vietnam). As a result, the improved filters are possibly used much longer and the treatment-fee of patients would be paid much cheaper. The devices have been successfully used in Hanoi Hospital for Kidney, Ha Dong Hospital

This research group won the 1st Prize VIFOTEC (3/2011) and received the Commending Diplomas from Prime Minister and MOST.

Product illustrations and fuel consumption monitoring solution

A research group of Laboratory for Automatics, IOP has designed and manufactured successfully a device (VFC, as shown in Fig. 5) to examine and manage on - line the fuel storage and consummated by engines (such as cars, autos…). Particularly, the obtained information is automatically in link to managers

by GPS Tracker system. Such devices have been successfully tested and used in different engines.

2.2.3. Space technology:

- Infrastructure for Space Technology:

VAST is currently executing two main projects of Space Technology: VNREDSAT 1 "Vietnam Natural Resources, Environment and Disaster monitoring satellite system" and the Project of construction of Vietnam Space Center. In 2012, the mentioned projects are both achieve theirs important targets. Project VNREDSAT 1: has completed the overall integrated phase (6/2012), satellite testing and quality assessment to launch the satellite into orbit in first half of 2013. Along with satellite manufacturing, infrastructure works has been accomplished at HHTP and National Remote Sensing Center to serve the purpose of satellite control and data image receiving. 15 staffs have finished the training course of technology transfer in France.

. VNREDSat-1 is completed for launch

Project "Vietnam small satellite for natural resource, environment and disaster management – VNREDSat-1B in cooperation with Belgium: In 2012, the Feasibility Study (FS) has been completed and presented to the related ministries for financial budget approving.

Vietnam Space Center Project: celebrated its Ground Breaking Ceremony at HHTP in 9/2012 of which was awarded as 1 of 10 outstanding Science and Technology events in 2012. The project progress is currently implemented on schedule and until December 2012, Detailed Design has been accomplished. Within the project framework, 18 staff have completed training course on Space Technology Project Management in Japan in 2012.

*Research and space technology applications:

In 2012, VAST has established the Chairman Board of Space Science and Technology Program which has selected research proposal. There are 18 proposals have been selected to be implemented in 2013 for 4 main fields: Satellite technology, GNSS and Ground Station (6), Space applications (6), Fundamental space applied research (5), Satellite launching technology (1).

**International Cooperation:*

In 2012, institutes of VAST has actively participated in international scientific workshops and organized several international workshops on Space Technology in Vietnam such as: "Vietnam – Japan Cooperation in Space Technology" in 9/2012. Another outstanding event is the visit to Vietnam and to work with VAST of NASA Administrator in December 2012.

Workshop "Vietnam – Japan Cooperation in Space Technology

Administrator of NASA visit to VAST

In 2012, STI has signed MOU with Office of Scientific & Technological Office – The People Republic Democratic Lao, and MOU with Institute for Research and Development – Republic France in cooperation on Space Technology Application and human resource capacity building and, in cooperation with JAXA, co-organized a training course for Radar image processing used for Japanese radar satellite ALOS-2 that will be launched in 2013 with more than 40 trainees from 15 organizations in Vietnam including research institutes, universities, Departments of Ministry of Defense.

* Space Education

STI has organized a Workshop on Space education for propagation of space knowledge, manufacture and launch the water rocket competition, poster contest with more than 300 pupils from 21 high schools taking part. From the competition, STI has selected 3 best posters, 6 teachers and pupils to Malaysia to attend the APRSAF-19. As request of the International Aeronautical Federation (IAF), STI has organized the "World Space Week" at Hanoi in some intermediate schools with seminars on history of the space research and utilizations, to make and launch water rocket, show the 3D film on the activities of the International Space Station (ISS).

World Space Week in Hanoi *(W)–2012*

Space Education activities

2.3. Biotechnology

In 2012, the biotechnology direction inside of the Vietnam Academy of Science and Technology (VAST02),totally 11 projects have been implemented, with a total budget of 2,150 million VND, including six projects (2011-2012) with a budget of 900 million VND were completed and five new projects (2012-2013) with a budget of 1,250 million are starting.

Of the six projects, five were principally directed by scientists of the Institute of Biotechnology, Hanoi and one by that of the Institute of Tropical Biology, Ho Chi Minh City. All the 6 projects will assess at the beginning of 2013. Among 5 opens new topic (2012-2013), there are three are being implemented at the Institute of Biotechnology and the other two at the Institute of Tropical Biology, all 5 threads will complete by the end of 2013.

In 2012, the Biotechnology Scientific Council of VAST has selected five new projects which will start in the implementation plan of 2013. Estimated cost for the new 5 projects for 2 years (2013-2014) is 2,500 million VND and funding in 2013 is only 1,250 on VND. Summarized, the total budget of 2013 for 10 projects of the field of biotechnology is 2,500 million VND.

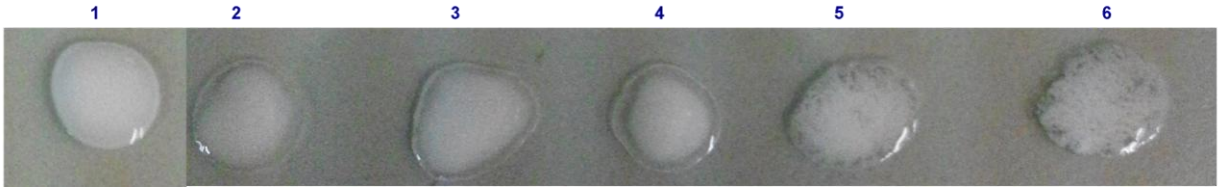
Considering the scientific contents all the research projects under the direction of biotechnology are highly application relevant. For example, development of rapid detection kits for influenza A virus, establishment of culture system for production of hairy root biomass of two precious medicina*l plants Ngoc Linh ginseng (Panax vietnamensis)* and tongkat ali (or pasak bumi, *Eurycoma longifolia*); transformation of gene responsive for biosynthesis of omega-7 in rice to increase rice quality. All the projects are implemented on time schedule and have achieved promising results as follows:

1. Study on the rapid detection of influenza virus using recombinant single chain antibody ScFv (VAST02.01/11-12), A/Prof. Dr. Chu Hoang Ha, Institute of Biotechnology is the principal investigator (IP).

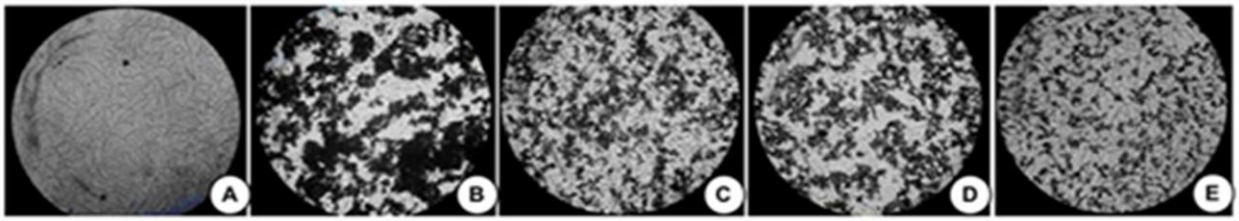
Single-chain antibody is a streamlined structure of recombinant antibody that retains specificity and effectively neutralizes the virus. Many advanced laboratories around the world are expected in this approach to be able to organize the production of recombinant antibodies in industrial scale. The Biotechnology Institute

conducted initially produce single chain antibodies specific to the pandemic strain of avian and human influenza for the purpose of construction of biological rapid detection kits of influenza A virus strains, such as H5N1, H1N1 using sequence-specific antibodies. Working principles of the detection kits are based on latex micro particle agglutination and strip test reaction.

After two years of implementation of the project was able to produce single-chain antibody specific for the influenza A/H5N1 virus strains; Preparation of 10 rapid detection kits for influenza A/H5N1 based on agglutination and also based on the principle of the test strip; Two articles were published in national scientific journals and trained one Bachelor student.



Birth flu diagnostic biological A/H5N1. Observation by eyes. 1: Latex solution associated antibodies without virus; 2,3,4,5,6: samples containing virus: latex particles are clustered at various levels



Birth flu diagnostic biological A/H5N1. Results under a microscope magnified 40 times. A: Latex solution associated antibodies without virus. B,C,D,E: latex particle agglutination antibody associated with the H5 antigen of influenza virus A / H5N1 at various levels

2. Research create recombinant conotoxin and test activity reduced pain (VAST02.02/11-12). A/Prof. Dr. Nguyen Bich Nhi, Institute of Biotechnology is the PI.

Conotoxins are being used as protein drugs in pain reduction, however they cannot be obtained from natural resources in the scale needed. Alternative solutions based on recombinant DNA technology open up great prospects. The project focused on cloning and expressing a number of recombinant conotoxins from snails collected in Vietnamese waters.

In the two years of implementation, the project was able to clone several genes encoding conotoxin and to express and to purify 2 recombinant conotoxins gene from *Conus magus* and *Conus mammoreus* at 5 liter fermentation scale, enough toxins for animal testing; analgesic activity test of recombinant conotoxin using hot blade model on mice at the Institute of Biotechnology in collaboration with the Military Medical Academy. Obtained results showed that recombinant conotoxin causes good analgesic effect in animals; Experimental and define LD-50 of conotoxin on recombinant mice; published three papers (2 in the Journal of

Biology , No. 4/2011 and 1 in Proceedings of the International Scientific Conference Coastal Marine Biodiversity and Bioresources of India and Adjacent areas to the South China Sea, November 24-25, 2011, Nha Trang); 1 articles have been accepted by the Journal of Biology and ongoing training of one PhD student.

3. Screening of enzymes involved in the resolution process cellulose, hemicellulose in metagenomics techniques (VAST02.03/11-12), PI is A/Prof. Dr. Truong Nam Hai, Institute of Biotechnology.

Metagenomics is a field of direct screening technology for specially value genes without culturing the host organisms. Metagenomics is being applied for genes from the living organisms of the special ecological conditions and extremely difficult in culture. Products of these genes have special characteristics, very high industrial value. This project, initially is using meta-genomics techniques to screen new genes which encode enzymes involved in cellulose and hemi-cellulose hydrolysis from microbial organisms living symbiotically in the termite intestinal.

After two years of implementation of selected projects shown that termites have the potential to serve as a source of metagenome for genetic screening; intestinal metagenome DNA have been extracted; Successful metagenomic libraries in the plasmid constructed. Over 45 000 cloned lines of the library have been screened and 7 lines have been found with agar hydrolysis activity higher than the control. Sequencing data revealed that two of these lines could be partially similar to beta-glucosidase gene and glucanase gene.

4. The study recruited a new antibiotic active substances for medical purposes from marine microorganisms Vietnam (VAST02.04/11-12) lead by Dr. Nguyen Phuong Nhue, Institute of Biotechnology.

The search for substances with antibiotic activity from marine sources is for many laboratories of international interest. The project's objective is to establish a collection of marine microbial strains which will be used for screening species (especially groups of rare marine microorganisms) which are able to synthesize new antibiotic active substances.

Two year of implementation grained a large collection, screening work is going on to find the most suitable candidate for new antibiotic biosynthesis.

5. Research process build biomass through the root hairs culture system (hairy roots) of a number of species of precious medicinal plants as raw materials for the production of the public health service (VAST02.05/11-12) lead by Dr. Pham Bich Ngoc, Institute of Biotechnology.

Biomass productions of rare medicinal plants through cell and organ culture, which are differentiated for bioactive compound productions, are considered promising technological solutions for production of pharmaceutical materials. Research project focused on the objective of setting up culture process for biomass production based on the hairy root culture system.

After two years of implementation of the project has generated transgenic hairy root cultures of by genetic transformation and identified the presence of the transgene by PCR in hairy roots of transgenic lines in two species of precious

medicinal plants Ngoc Linh ginseng (*Panax vietnamensis*) and pasak bumi tree (*Eurycoma longifolia*); developed the procedure of hairy root biomass culture; determined growth parameters of 3-5 lines each of hairy root cultures of Ngoc Linh ginseng and pasak bumi tree plant; published the first scientific paper and prepared to submit next on the Journal of Biotechnology.

6. Study on enhancing quality of rice seeds through genetic transformation of fatty acid omega-7 expression in specific particles (VAST02.06/11-12) lead by A/Prof. Dr. Nguyen Huu Ho, Institute of Tropical Biology.

Genetically modified crops for improving the quality of agricultural products receiving great attention in many countries, including even in those countries where transgenic crop technology is facing many obstacles. The ambition of this project is to create lines of rice (*Oryza sativa* L.) haboring gene for biosynthesis of fatty acid omega-7 with specific promoter driving the expression in seeds.

This project was successful in creating cell suspension from scar tissue culture in liquid medium; establishing the system in vitro plant regeneration of rice from callus and cell suspension; Creating successful two rice lines carrying the gene for fatty acid omega-7 and published 01 articles in the Journal of Biotechnology.

In general, the all projects completed in 2012 have gained certain success and results which could be published in the national scientific journals; some projects reach very close to the phase, of product development and product testing. However, considering the final goals of every Project that mostly intended to develop the product, even if only in the form of "prototype of product", planed to complete the product development, no project did achieve that. The main reason can be stated as:

The implementation time, commonly fixed as 24 months, is not enough for the research process in the laboratory and to develop the product. Usually, these processes require a period of 5 to 10 years.

Scale of financing, limited to 500 million USD /2 year/project, might be enough for prove the concepts of innovation, but surely not enough for product development and rarely for product testing.

For new breakthroughs it will probably have to organize research projects in form of research programs or research problem clusters bringing larger human resources (inter-disciplinary, multi-sector) together and allow ensuring the financial support (tens billion VND/problem). By requirement of high scientific quality and innovation, with larger dimension of investment the scale and scope of research projects could gain true scientific and practical value.

2.4. Material Sciences

In the field of Material Sciences the research activities on nanoscience and nanotechnology were the most active ones and have achieved the following main scientific results:

Iron oxide-based conjugates for cancer theragnostics

The conjugates of Fe_3O_4 nanoparticles (MNPs) encapsulated by several organic materials such as oleic acid (OL), starch (ST), dextran (D), chitosan (CS), oleoyl-carboxymethyl chitosan (OCMCS) and the copolymer of poly(styrene-co-acrylic acid (St-co-AA)). The ferrofluids stability and toxicity were also considered. The magnetic inductive heating (MIH) curves were measured using a set up with an alternating (ac) magnetic field of strength of 40-100 Oe and frequency of 180-240 kHz. We then present new results dealing with attempting to apply the MNP/copolymer ferrofluid for treatment of Sarcoma 180 tumor. *In vitro* as well as *ex vivo* MIH experiments were carried out as preparation steps in order to estimate the proper conditions for the *in vivo* MIH experiment. As for the latter we have successfully carried out the treatment of solid tumor of size around 6×6 mm inoculated on Swiss mice with use of a dose of 0.3-0.4 mg/mL ferrofluid injected subcutaneously into the tumor and field irradiated for 30 minutes. Two groups of treated mice were recovered in 3 weeks by the 3 times of MIH treatment during the first week. We finally show that curcumin loaded MNP-based conjugates showed up to be potential agent for application as bimodal contrast enhancer of magnetic resonance imaging (MRI) and fluorescence imaging. Additionally *in vitro* and *ex vivo* studies by these two techniques evidenced that macrophage is capable to uptake and tends to carry the MNPs into tumor.

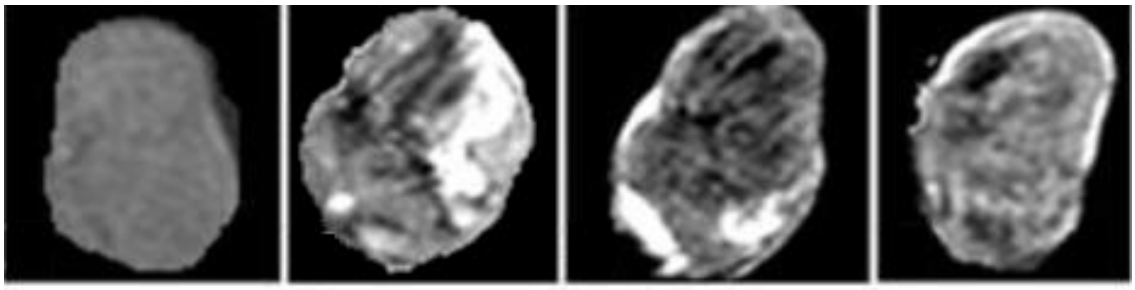
Cont. A: Date 0

Cont. A:Date 7

Cont. A: Date 21

Treat.D: Date 0 Treat.D: Date7 Treat.D:Date 21

Images of the two mice of control A (top) and treated D (bottom) mice at 3 date periods. Ferrofluid used: Fe_3O_4/poly(St-co-AA)



A B C D

MRI (ex vivo) images for tumors injected by Ho1-uptaken macrophages.

A: cancer control, B: direct injected, C: vein injected, D: vein injected, magnet attract.

Fluorescent label tool based on lanthanides nanophosphors for viral biomedical application

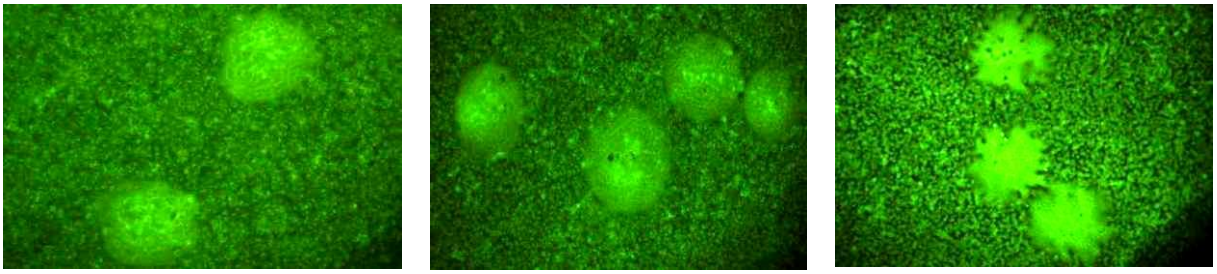
The luminescent lanthanide nanomaterials (LLNs) linked bioconjugates and their application as a label tool for recognizing virus in processing line of vaccine industrial fabrication. Several LLNs with the nanostructure forms of particles or rods/wires with europium (III) and terbium (III) ions in lattices of vanadate, phosphate and metal organic complex were prepared to develop novel fluorescent conjugates able to be applied as labels in fluorescence immunoassay analysis of virus/vaccine.

In regards to the LLNs we have successfully synthesized nanoparticles around 10nm of YVO_4:Eu (III), with high emission in red spectral region, nanorod and nanowire of $TbPO_4{\cdot}H_2O$ and $Eu_{1-x}Tb_xPO_4{\cdot}H_2O$, width 5-7 nm and length 300 nm, showing very bright luminescence in green, and core/shell nanosized Eu(III) and Tb(III)/Eu(III) complexes with naphthoyl trifluoroacetone and tri-n-octylphosphineoxide (Eu.NTA.TOPO@PVP, Eu_XTb_{1-X}.NTA.TOPO). The appropriated core/shell structures can play the double role, one for enhancing luminescence efficiency and another for providing nanophosphors with better stability in water media for facilitating the penetration of nanophosphor core into biomedical environment.

The organic functionalizations of the obtained LLNs were done through their surface encapsulation with a functional polysiloxane including active groups as amine (NH_2), thiocyanate (SCN) or mecarpto (SH). The properties of functional sol gel matrix have great influence on the luminescence properties, especially luminescence intensity of YVO_4:Eu(III), Eu.NTA.TOPO@PVP, $TbPO_4{\cdot}H_2O$ and $Eu_xTb_{1-x}PO_4{\cdot}H_2O$. Bioconjugation processes of the functionized LLNs have been studied with some bioactive molecules such as biotin, protein Immunoglobulin G (IgG) or Bovine Serum Albumin (BSA).

The results of LLNs-bioconjugate linking with IgG for recognizing virus (vaccine) will be presented in brief. It is consistent to state that the LLNs bioconjugates prepared from YVO_4:Eu (III)–nanoparticles, $TbPO_4{\cdot}H_2O$ nanorod or wire and EuNTA.TOPO@PVP nanosized core/shell complex could be used as labels for recognizing virus in diagnosis or in vaccine production by use of fluorescence immunoassay (FIA) method. The fluorescence images of the incubated specimens consisting of LLNs biconjugate and vaccine fabricate could be obtained well in sharpness, reproductivity and stability.

However, much work still need to be done to develop an ordinary LLNs-conjugate in using FIA method for analysis of virus and moreover extend to study biomedical cell processes at nano/microscale in practical application.

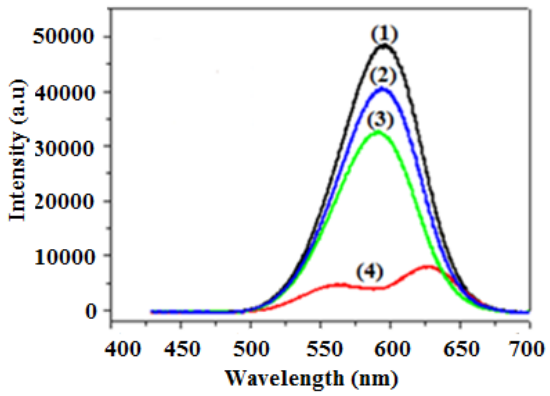


(a) **(b)** **(c)**

Microimage of measles virus infected Vero cells in using $TbPO_4$-IgG code: 020911 (a) (Tb, Eu)PO_4-IgG code: 030911 (b) and $EuPO_4$-GDA-IgG code: 040911 (c).

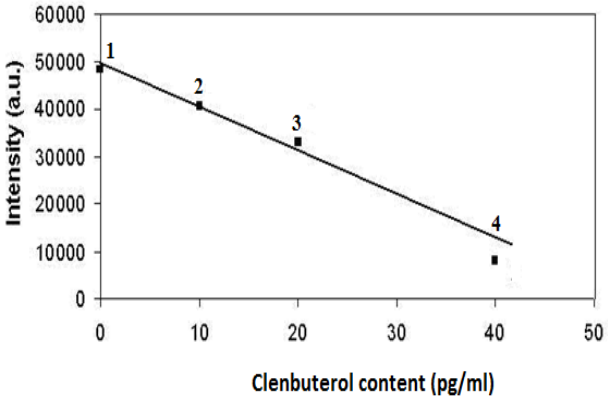
Fluorescence resonance energy transfer (FRET)- based nanosensor for rapid detection of clenbuterol

A fluorescence resonance energy transfer (FRET)-based nanosensor for the detection of clenbuterol was fabricated. The nanosensor consists of CdTe quantum dots coated by clenbuterol recognizable agent naphthol and diazotized clenbuterol. Changes in maximal photoluminescent intensities of the nanosensor were utilized to measure clenbuterol concentrations. The maximal photoluminescent intensities of nanosensor were found to decrease with increasing clenbuterol concentrations, following a linear correlation. We have successfully fabricated nanosensor for detection of clenbuterol with the sensivity until 10 pg/ml.



Photoluminescence of nanosensor at varying clenbuterol concentrations

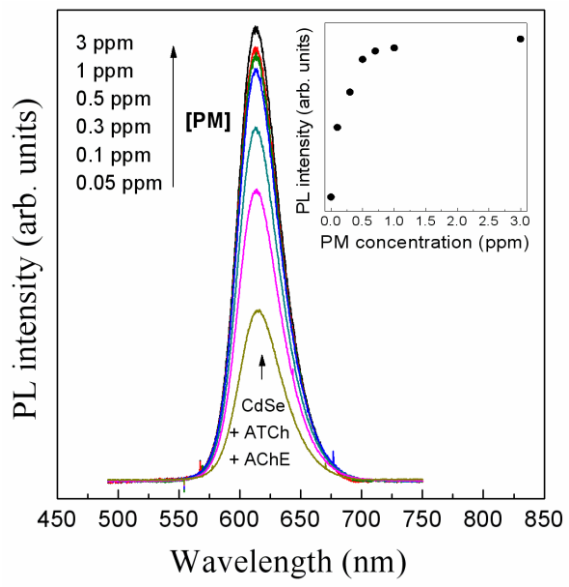
(Sample 1, 2, 3, 4 = 0, 10, 20, 40 pg/ml, respectively).



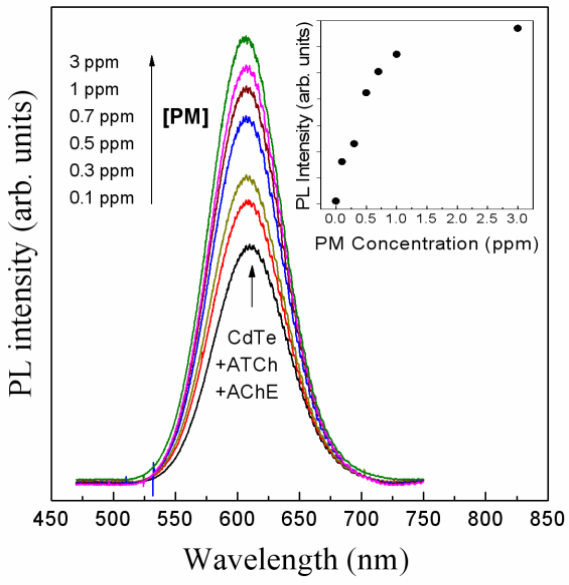
Correlation between maximal photoluminescent intensities of nanosensor and clenbuterol concentrations.

Fluorescence-based biosensors from functionalized CdSe and CdTe quantum dots for pesticide detection

Highly sensitive fluorescence biosensors for pesticide detection was fabricated. The biosensors are actually constructed from the complex of quantum dots (QDs), acetylcholinesterase (AChE) and acetylthiocholine (ATCh). The biosensor activity is based on the change of luminescence from CdSe and CdTe QDs with pH, while the pH is changed with the hydrolysis rate of ATCh catalyzed by the enzyme AChE, whose activity is specifically inhibited by pesticides. Two kinds of QDs were used to fabricate our biosensors: (i) CdSe QDs ***synthesized*** in high-boiling non-polar organic solvent and then functionalized by shelling with two monolayers (2-ML) of ZnSe and eight monolayers (8-ML) of ZnS and finally capped with 3-***Mercaptopropionic acid*** (MPA) to become water soluble; and (ii) CdTe ***QDs synthesized in aqueous phase then*** shelled with CdS. For normal checks the fabricated biosensors could detect parathion methyl (PM) pesticide at very low contents of ppm with the threshold as low as 0.05 ppm. The dynamic range from 0.05 ppm to 1 ppm for the pesticide detection could be expandable by increasing the AChE amount in the biosensor.



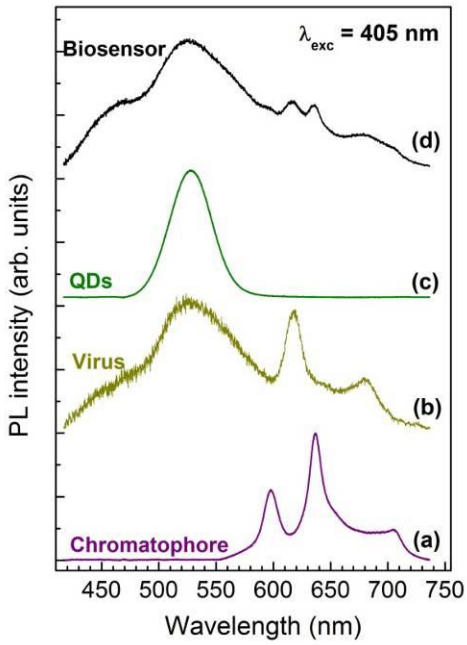
PL spectra (under the 405-nm laser light excitation) of CdSe-AChE-ATCh as a biosensor to detect different PM contents. The inset shows the relationship between the PL intensity and the PM contents.



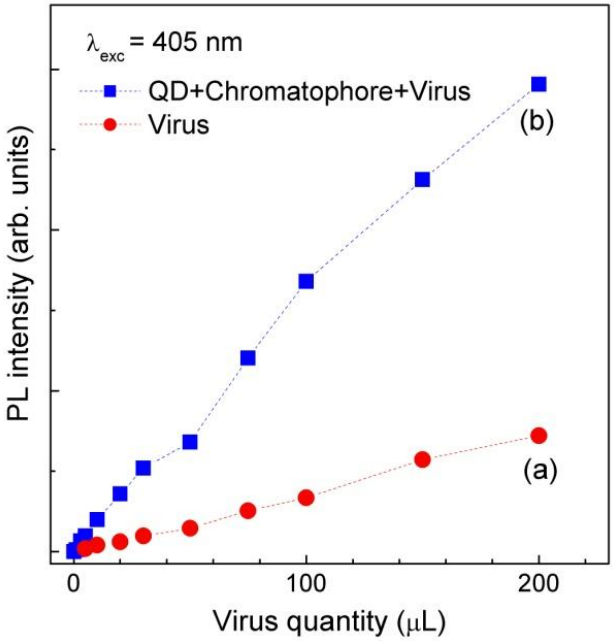
PL spectra (under the 405 nm laser light excitation) of CdTe-AChE-ATCh as a biosensor to detect different PM contents. The inset shows the relationship between the PL intensity and the PM contents.

Fluorescence biosensor based on CdTe quantum dots for specific detection of H5N1 avian influenza virus

Fluorescence biosensors based on CdTe quantum dots (QDs) for specific detection of H5N1 avian influenza virus was fabricated. The core biosensor was composed of (i) the highly luminescence CdTe/CdS QDs, (ii) chromatophores extracted from bacteria *Rhodospirillum rubrum*, and (iii) the antibody of □-subunit. This core part was linked to the peripheral part of the biosensor via a biotin-streptavidin-biotin bridge and finally connected to the H5N1 antibody to make it ready for detecting ***H5N1*** avian influenza ***virus***. Detailed studies of each constituent were performed showing the image of QDs-labeled chromatophores under optical microscope, proper photoluminescence (PL) spectra proper of CdTe/CdS QDs, chromatophores and the H5N1 avian influenza viruses.



PL spectra of chromatophores purified from bacteria Rhodospirillum rubrum, H5N1 avian influenza virus, CdTe/CdS QDs, and of the overall biosensor composed of all the mentioned constituents.



PL intensity of H5N1 avian influenza virus (a) and of biosensor composed of all the CdTe/CdS QDs, chromatophore and H5N1 avian influenza virus under detection (b).

2.5. Biodiversity and Biological active substances

The antidrug medication Heantos 4 (Institute of Chemistry) based on medicinal plants has been authorized for production and use by the Drug Administration (Authorization Nr. QLĐB-365-12). The 1st production batch of this medication with more than 3000 treatment doses is being implementing now. Heantos 4 is now in research on the mechanism of activity as well as on possibility for treatment of other mental diseases in cooperation with UBC university, Vancouver, Canada.

The book "Useful Flowering Plants in Vietnam II" is one of the results from the cooperation project "Bioprospecting on Biological Materials of Vietnam" between the IEBR (Vietnam) and the KRIBB (Korea). The book includes 479 pages of 230 useful plant species and 920 colour photos, written in Vietnamese and

English and meets the international standard with ISBN 978-89-6709-007-4. The species described in this book are supplied with herba exemplares and sample for molecular-biological researches. This is a valuable book for scientific research and education.

The project ĐTĐL.2011-G/23 "Investigation and evaluation on the threaten animals and plants, which should be protected with priority in order to improve the Vietnamese Redbook" (Institute for Ecology and Natural Resources): Investigation and addition to the new threaten species in 5 geographical areas: The North (the National Garden Xuan Son); the Middle (the Natural Conservation zones Dak Rong, Bac Huong Hoa); the Highland (the National Garden Chu Yang Sin); the Island district (Phu Quoc, Con Dao island). The collecting data are now analyzed and documented for about 1000 animal and plant species, which are in dangerous and threatening and need to be protected with priority.

The project "Flora, Fauna and Redbook of Vietnam" provided excellent results and was awarded with Ho Chi Minh price in 2012.

The project "Study on the procedure to synthesis of amodiaquine hydrochloride for preparation of the two constituents antimalaria medicament amodiaquine hydrochloride/ artesunate" (Institute for Marine Biochemistry): The procedure for synthesis and purification of amodiaquine hydrochloride has been improved. 35 kg amodiaquine hydrochloride which meet the standard USP 2008 and can be used for human, are beeing received.

Hericium erinaceus in the nature

HERIGLUCAN

The functional food HERIGLUCAN (Institute of Natural Product Chemistry): 300mg/capsule is produced from the cultivated mushroom *Hericium erinaceus*. The active principles are 1,3- and 1,6-β-D-glucan. This product is used for improvement of health, stabilisation of immune system, support for treatment of cancer, especially the prostate cancer.

2.6. Earth Sciences

Introduction:

The scientific activity report of Earth Science Discipline in 2012 includes the results of Science and Technology (ST) projects carried out by several institutions

of Vietnam Academy of Science and Technology (VAST) such as Institute of Geological Sciences, Institute of Geophysics, Institute of Geography and Institute of Resources Geography in Hochiminh city.

In 2012, these institutes completed 23 state-level ST projects, including: 3 of Protocol International Cooperation, 2 independent, 19 of fundamental research funded by the National Foundation For Science and Technology Development (NAFOSTED); 22 VAST-level projects, including: 6 of priority orientations, 2 of Fundamental Investigation, 4 independent, 6 for young scientists and 4 of provincial cooperation. In addition, many ST projects of institute-level as well as ministerial, central and local level were also terminated by these four institutes of Earth sciences.

The 2012 is also the year commencing a series of ST projects belonging to State programs approved by Government for 2011-2015 period implementation as well as the projects accepted by VAST. According to statistics, in 2012, the 4 institutes of earth science mentioned above deployed 39 state projects, including: 15 belonging to the programs of Tay Nguyen 3 and KC 08/11-15, 4 of protocol international cooperation, 5 independent, 2 of program of application-oriented fundamental research and 13 of NAFOSTED Foundation; 19 VAST Science and Technology projects, including: 6 of priority orientations, 3 of investigative research, 2 independent, 4 independent for young scientist and 4 of provincial cooperation.

Main research results

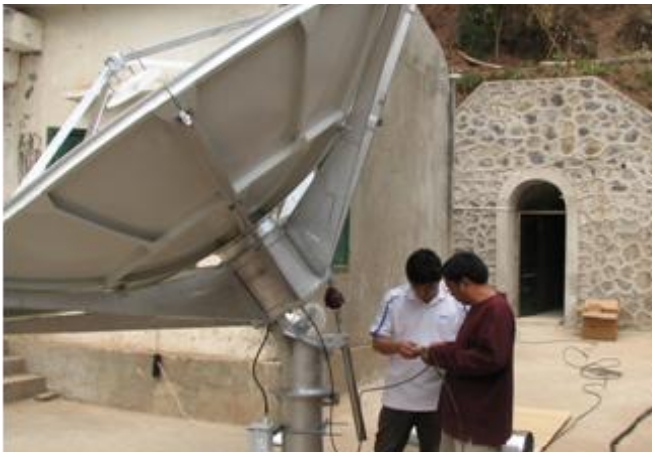
Research on Natural Disaster Prevention:

A numerous national-importance projects have been deployed for researching natural hazards, often occurring in our country for positively orientating to rational and sustainable planning and utilization of territory, ensuring the highest level of safety for civil, economic important structures and community with the group of projects focusing on ground fissuration, collapsing, landslides, flash floods, mud-flows, debris-flows, riverbank erosion, coastal erosion and accretion, earthquake, etc.

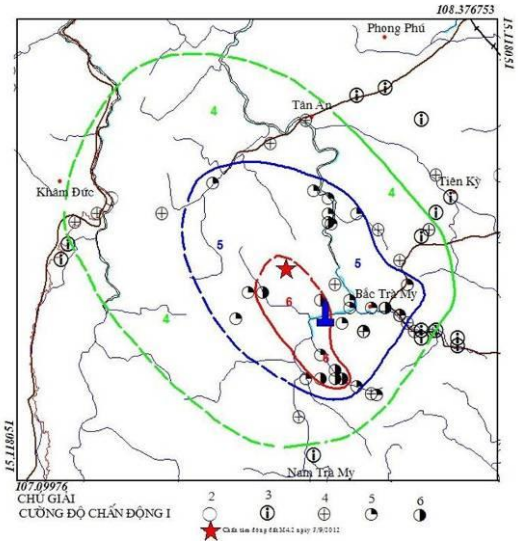
Geohazards have been researched in some important areas as Tay Nguyen (Central Highlands) for landslides, flash floods, debris-flows, and in other highly susceptible areas, where ground fissurations, rock falls, landslides frequently and severely occur, affecting directly to local mountainous habitants in Quang Nam, Quang Ngai provinces (Institute of Geological Sciences), Lam Dong province (Institute of Resources Geography in Hochiminh city). Geo-risk assessment and management, firstly studied in Vietnam, for the case of Central Highlands would be the bases for applying to other regions as well as the whole country (Institute of Geological Sciences). The research results of landslide hazard zoning for the provinces of Quang Nam, Quang Ngai and Lam Dong, after full completion, could be immediately transferred to local authorities for timely active response. In addition, an important issue related to the current tectonic impact on the reservoirs in the Central Highlands has been, for first time, researched (Institute of Geological sciences). Especially, within the framework of international cooperation with the Ministry of Science and Technology of the Lao PDR, the Institute of Geological

Sciences has established a set of geohazard maps (hazard zoning and risk assessment for earthquakes and landslides) for all territory of Laos. For the first time in Vietnam, an automated technology monitoring the dynamic and property changes of groundwater for warning landslides, underground erosion, earthquakes, ground subsidence has been successfully piloted and the monitoring station runs soundly, giving good qualitative and stable data (Institute of Geological Sciences).

Trạm điều hành tại Trung tâm báo tin động đất và cảnh báo sóng thần, Viện Vật lý địa cầu



Lắp đặt thiết bị truyền số liệu tại trạm địa chấn Sơn La



Sơ đồ đường đẳng chấn động động đất M=4,2 xảy ra lúc 20h46 ngày 03/09/2012 tại khu vực Bắc Trà My, tỉnh Quảng Nam

Earthquake have been intensively studied, especially the induced-earthquake experiences, obtained from Son La hydropower reservoir (Institute of Geophysics), has contributed significantly to the timely preliminary research on induced - earthquakes, which frequently occur in the area of Song Tranh 2 Hydropower in 2012. The VAST's report with the initial scientific assessment on the cause, magnitude and probability of induced earthquakes has provided the bases for the Prime Minister to make timely necessary decisions on safe operation of this hydroelectric reservoir. A numerous advanced methods are also applied for micro-

zoning and risk assessment of earthquake in large cities (Hanoi and Hochiminh city), assessing earthquake danger that cause tsunami in coastal Central, studying in detail earthquake activities of some major faults in the North Central (Song Ca, Song Ma) based on the network of broadband frequency monitoring, obtained via international cooperation (Institute of Geophysics and Institute of Geological Sciences).

Particularly in 2012, a group of projects studying active fault, earthquake and tsunami risks in the areas planned for nuclear power plants in Ninh Thuan, approved by the Ministry of Science and Technology, funded by NAFOSTED, with the integrated application of advanced survey and research methods in geology and geophysics (Institute of geological sciences and Institute of geophysics). The results of this study will be an important scientific basis for deciding the location to build nuclear power plants as well as evaluating the survey study of Russian and Japanese partners.

The studies on other natural disasters such as drought, floods, soil erosion, soil degradation and desertification, climatic extremes (unseasonal rains), lightning, etc. are also implemented intensively in the important socio-economic areas such as the Central Highlands, the Red River Delta and some Southern Central provinces. Beside the meteorological drought, the socio-economic aspect is also considered for obtaining a thorough solution for overcoming drought and mitigating its consequence (Institute of Geography). In assessment study of soil erosion, a new method, Th-U radioactive isotope, is applied with an expectance of better quantification of soil erosion rate and extent in the main river basins of Central Highlands in comparison with traditional methods (Institute of Geological sciences). Remarkably, in all studies of droughts, floods, unseasonal rains, etc ... the effects of global climate change and sea level rise have been taken into account (Institute of Geography). Simultaneously the study assessing the impact of climate change to natural, environmental conditions and socio-economic activities in the susceptible areas as the Central has also developed with a good result (Institute of Geography). In particular, study the impacts of climate change and sea level rise on groundwater environment, inundation, shoreline changes of the Spratly Islands has allowed forecast the future changes and propose effective preventive measures (Institute of Geological Sciences). In addition, the process of survey and design to prevent thunderbolt is applied to Vietnam and LPS software for designing of lightning prevention is granted a certificate of copyright (Institute of Geophysics).

Research on Environmental Protection:

Studying on the change of the natural, socio-economic environment after flash floods so as to propose solutions for environmental recovery, improvement and management in the northern mountainous provinces has been realized for the first time and the its result will substantially provide for researching management of natural risk management, a new research trend in Vietnam (Institute of Geological Sciences).

The study evaluating overall environmental and natural conditions for oyster-culture, contributing to economic development in Tra Vinh coastal area (Institute of Resources Geography in Hochiminh city), as well as the study on ability to

accumulate heavy, toxic metals in sediments in oyster-farming area of Go Cong district - Tien Giang province (Institute of Geological Sciences), etc. are a new direction studying natural environment for aquaculture development.

Evaluating the possibility of using some kind of coal sludge in processing heavy metal contaminated waste water in Quang Ninh (Institute of Geological Sciences) is a continuation of the research and development for technology processing environment which has been proposed in recent years. A process in laboratory manufacturing adsorbent material particles on the bases of coaly sludge in waste water has been made out; it meets all requirements for using materials as a treatment of environmental pollution. Particularly, study of pollution in hanging lakes in the water-wanted mountainous districts of Ha Giang Province (Institute of Geological Sciences) in order to propose the solutions for appropriate technology, evaporation reduction, management model and process of pollution treatment, to ensure clean water for local habitants, has an important practical significance.

Research on Rational Utilization of Natural Resources

Land resources: assessing the current land degradation and its causes, comprehensively studying on land degradation and desertification in order to propose solutions for durable use of land and sustainable development have been realized in some important areas such as the Central Highlands, Thanh Hoa, Nghe An and Ha Tinh (Institute of Geography).

Water resources: In regional scale, the use of water resources is in scientific research for the overall solution dealing with interest conflicts in water exploitation in Central Highlands (Institute of Geography); in local extent, assessing freshwater resource in sand dunes is deployed for Cau Ngang and Tra Cu districts of Tra Vinh province, researching scientific bases for exploiting surface water as domestic use in condition sea level rise due to climate change is applied in coastal area of Ca Mau peninsular (Institute of Resources Geography in Hochiminh city).

Mineral resources: Assessing the position, role and general exploitability of mineral resources for the socio-economic development and national security is carried out for the Central Highlands. The Indium in some tin deposits in Vietnam has been prospected and technology process for Indium recovery has been built in laboratory extent. This process is, for the time, made in Vietnam, its products are accepted and its research results could be registered for intellectual property. The results of evaluating the potential of fine art stones in Central region (from Thanh Hoa to Quang Nam) have defined many quarries qualified as fine art stones and the products made from them could meet the aesthetic requirements. Moreover, prospecting sericite and proposing guideline for its exploitation in North Central also create a new material source for development with different purposes. Data bases for fine art stones and sericites of Central provinces are now available for transferring to the local utilization.

In addition, the comprehensive assessments of natural socio-economic conditions oriented to sustainable development in some local areas, as well as the study for setting up the criteria of sustainable development for local extent

(province and district) and regional extent (Central Highlands) also have been carried out.

Activity Direction in 2013:

Implementing a series of national science and technology projects within the framework of the state-level science and technology programs: (i) Studying active faults and estimating earthquake risks in the areas expected to build nuclear plants in Ninh Thuan province as well as in the Song Tranh 2 hydropower area in Bac Tra My district - Quang Nam province; (ii) complementarily studying and publishing the map set of natural hazards in all territory and waters of Vietnam; (iii) Continuing to study on warning and forecasting geohazards (ground fissuration, landslides, flash floods, debris flows) in Central Highlands; (iv) Researching the issues related to drought, floods, soil erosion, etc. with the new approaches; (v) Synthetically evaluating natural conditions, natural resources (land, water and mineral resources) for the sustainable development of the Central Highlands and some other localities; (vi) Studying the mechanism and model of pollution propagation in water and soil environments as well as the pollution treatments by natural mineral used and environmentally friendly technologies.

2.7. Marine Science and Technology

In the year 2012, the Science Committee of Marine Science and Technology had completed, checked and taken over 2 branch projects under the project 47, 2 projects at state level; 1 project under East Sea-Island program; 5 projects under Vietnam Academy of Science and Technology (VAST); 1 protocols project. Otherwise, there were 2 projects at institute level had been completed and are on the acceptance process, 6 projects at institute level had been completed and are being summarized. Furthermore, the following five projects under program KC.09/11-15 was started to develop in the year.

Project No.19: 5 branch projects under "the cooperation program between Vietnam and other countries on the investigation of natural resources – environment of East Sea" including research on active element source and marine biodiversity of Vietnam sea; research on hydro-meteorological and dynamics of East Vietnam Sea; research on environmental pollution of Vietnam sea areas; research on environment of Gulf of Tonkin; and study of climate change and sedimentation condition of Central sea region in Pleistocen-Holocene. This project assesses and evaluates the effect of international cooperation activities with nearly 20 foreign countries and more than 10 international organizations over 40 years through models and principal cooperation in order to propose and construct the policy system of international cooperation on the sea investigation and study for our country.

Project No.14: "Fundamental research and natural resource assessment, ecological and geological wonders of the Sea and Islands of Vietnam." Spatial resource is a new approach, which are value and benefits of using the location and space with the development purpose of social economic, national defense, and other national interests. The Position and Spatial resource were evaluated by the authors of the project in three components: natural-geo, economic-geo and political-geo. Based on the evaluation criteria of three components, the authors rated Position and

Spatial resource of the sea-island of Vietnam: Northern, North Central, South Central, South and the Paracels and Spartly islands.

Geological wonders of Vietnamese islands were classified under geological categories including: marine wonders; coastal wonders; and island wonders with different geological diversity such as location, structures, terrain status – geo system, local matrial component system, and internal geological processes - exogenous. On this basis, the authors review spatial wonders for 5 island waters of our country.

Eco wonder is defined as the species with the shape, size, unusual color or populations, large-scale biome and tightly organized, the typical ecosystem or a combination in an area which is large enough to maintain its existence in the long term, there are special values of biological resources, biodiversity or habitats of valuable conservation of species nature. The evaluation criteria includes: biodiversity, uniqueness, unique, spectacular along with other added value ; and Eco wonder also be classified according to the ecosystem and the eco-region. On the basis, the authors evaluate Eco wonder of the 5 island waters which was mentioned above.

In conclusion, the authors integrated the assessed results of spatial resource, Eco wonder, and Geological wonder to find out the typical island waters of our country and thus proposed the exploitation and management of this new resource.

Independent projects at State level: "Study the impact of upstream reservoir works, morphological changes and natural resources-environment of coastal estuaries of North Delta" has given the methodology to assess the impact of the upstream reservoir to every natural object in coastal estuaries; forecast the impact of existing works and the works will be built by 2025, morphological variables and natural environment of the study area in order to proposed solutions for both effective exploitation purpose of positive effects and overcome negative effect of these impacts.

Project: "Study the impact of sea level rising due to the global climate change with the fluctuation of the Spratly Islands" has made the process of monitoring Spartly islands, fluctuations region of Spartly islands in correlation with every scenario of rising sea levels in the areas of: ground water quality, flooding and erosion Island. The distribution maps of 23 islands for each stage had been established in correlation with scenarios of rising sea levels. Since then the proposed solutions has given out to adapt climate change, mitigate natural disasters and contribute to the maintenance and protection of the island such as measures to restrict saltwater intrusion, erosion and flooding.

Projects of Vietnam Academy of Science and Technology

- Project "Research on the change of geomorphology process and development trend of the terrain north-east coast (from Mong Cai to Ninh Binh province) due to the rising in water levels of East Sea." On the basis of analysis of the new and modern tectonic movements, it evaluated the role of endogenous processes in the formation of the topographic of study area. On the diagram, the authors divided seven regions with different characteristics of the modern movement as the basis for calculating the partition as well as assessing the impact of the rising in sea water

levels on the North East coast. Through the analysis of marine fuels motivation, vegetation, human activities along with rising sea levels, the authors give the exogenous role in the generation of terrain study area, shown in diagram the exogenous characteristics of the coastal zone of the study area and 7 forecast areas. On the basis of analyzing the factors forming the topography, history, development, and rule of creating terrain in the rising water level conditions, the authors conducted and forecasted the variable topography trend and geomorphological processes in the diagram for 8 different forecast regions on the entire coastal study area. Through the study results, the authors propose solutions to prevent natural disasters and rational use of the territory.

- Project: "Research on the impact of climate change on the coral reef ecosystem of Vietnamese coastal areas" has identified storms and rising sea temperatures that has the most impact on the coral reef ecosystem, and the other factors such as freshwater caused by heavy rainfall which has less impact on the coral reef, on the other hand, the research results also show a clear impact on the coral reef in the South than in the North. Moreover, Project also determines the adaptive threshold of some coral species which adapted to the changes in salinity and temperature caused of climate change through the experimental plots, from which, it is able to identify whether the El-Nino phenomenon increases the temperature and rainfall decreases salinity of the sea water and do they affect the coral reef or not. Using the results of the study, project gave out the solution to adapt the climate change and rehabilitate the coral reef.

- Project "Research on the structure and deformation of virus communities and free-floating bacteria in the coastal environment of North Vietnam to control and treatment pollution, balance and develop the sustainable marine ecosystems" has gained the synchronization research results on bacteria, sea viruses in Vietnam using the modern research methods in advanced countries by Vietnamese scientists. Project pointed out the research results on the state of the distribution and density fluctuations in space and time of the groups of bacteria and viruses in water in some coastal zones of Vietnam. These are important documents for a more completed assessment of the total biomass and free-floating bacterial function in the study area. Threads also make findings about the community structure of bacterial and viruses as well as their correlation with the environmental factors. For bacterial communities, the researchers defined the major bacterial groups, the total number of classification units in the sample, the absorption and metabolism of 31 organic compounds in 6 groups of microbial communities, structures and correlation to the environmental factors. For the viruses, they identified the changes, form and structure as well as correlation with environmental factors in the research area. Through the results of the study, the authors have proposed measures using environmental health assessment methods and indicator organisms in the aquatic ecosystem, solutions to limit the damage caused by viruses, bacteria.

- Project "Research on changes in the northern coastal estuaries and the North Central information using high-resolution remote sensing and GIS for the development of marine economic strategy and protection of natural resources and environment". The project find out the evolution and development of important

estuaries in the North Sea and North Central regions as well as scale spatial variation of them in 45 years under the effects of natural factors and political exploitation of human beings. It proposed the major methods using in the exploitation and use of natural resources to protect the environment of the important estuary in the North and North-Central sea regions; and the political solutions to adapt to the context of the climate change and rising water levels in the next decades.

- Project "Research on the applications of fluoride polymer coating containing nano-additives combined with Al/Zn coating to protect metal work in the conditions of tidal and wave zone" has successfully synthesized nanosilica and its modified with some corrosion inhibitors and with organic compounds. It also successfully research the corrosion inhibit ability to some heterocyclic nitrogens for steel base coated with Zn/Al alloys, the corrosion protective properties of the epoxy primer system containing nanosilica beared corrosion inhibitors, the corrosion inhibit protection and ultraviolet solidity of class phurpolymefluor containing nanosilica. The research explored the field applicability of epoxy-polymefluor coating system on the steel coated Zn/Al alloy and had conclusions about the applicability of coating system used for the metal work in the tidal and wave zones.

In the year 2012, the projects with subject relating to the climate change and rising water levels had gained the initial results of projects at the Institute and State levels to prepare for the implementation of the project on climate change and rising water levels. The research orientations on the exploration of economic evaluation ecosystem, source landslides on the continental shelf to assess the watershed environment capacity giving out the results and have been developing in the projects at State level and on the way to participate in larger projects.

The marine science and technology decided to organize one national conference every year. The Oceanographic Institute has organized "International Conference on the East Sea 2012" this year comprising of 8 subcommittees: biodiversity and marine conservation, marine biology and aquatic environment, oceanographic processes and marine technology, biochemistry and marine natural compounds, marine geology and chemistry, natural disasters and climate change, biological and harmful algal biology, marine management. In the conference, there were 152 scientific reports including 21 reports of foreign scientists.

2.8. Environmental technology and energy

In 2012, the environment and energy division has carried out 6 projects in which two are transitional and the other four are new openings. The total budget is 1370 million VND, 370 million VND for transitional projects and 1000 million VND for new projects. All projects were chaired and operated properly according to the plan. Here are a few results:

1. Research the theoretical basis of the chemical reaction of the pesticides under the carbonization and design the lab-scale carbonization equipment to treat the persistent pesticides belonging to POPs group by the carbonization method to reduce environmental pollution.

2. Research to classify and to select 5 hydrogen-generated bacteria from the cattle's manure and have identified the classifying location of the 4 domestic bacteria which can generate hydrogen to be used as a new energy resource.

3. Invent the technology to treat hydrogen sulfide upon the nanocomposite catalyst material Fe/MgO to be used to treat biogas and research the synthesis procedure of Fe/MgO, $Fe_2O_3.H_2O$ nanocomposite on bentonite carrier to be used as a material to diminish H_2S by drying to replace the foreign-imported materials and equipment.

4. Applied the isotope dilution to access the heavy metal pollution in kids' food.

5. Researched the Membrane Bioreactor in wastewater treatment and Nitrogen-rich industry. Designed, built, assembled the lab-scale prototype, 50 L/day and researched the influence of weight on the COD, BOD, SS, T-N, T-P, coliform treatment effectiveness.

6. Researched to propose and issued the draft of the technical standards for power stations using renewable energy to connect to the national power grid.

Moreover, the project "Application of the modern technologies to treat red mud to useful products based on the studies of the characteristics of the red mud originated from the alumin production from bauxite in Tan Rai and Nhan Co Alumina complex" and the project "Research the steel making and non-fired material making technology from the red mud originated from the alumin production in Tay Nguyen" have invented the steel making procedure from the red mud with the 10 tons of red mud/batch capacity, the iron recovery yield more than 70%. The steel produced can be used to make carbon steel or steel alloy satisfying Vietnamese Standards. It helps to develop the sustainable bauxite processing and exploitation industry in Tay Nguyen.

Implementation Planning in 2013:

In 2013, the environment and energy division will carry out 5 new projects and 4 transitional projects with the total budget of 2250 million VND, the new opening projects include:

1. Survey, assess the status and the origin of the Red river pollutants in Vietnam upstream by modern analytical methods.

2. Assess the influence of climate change on the water quality in Cau river upper catchment areas of the two provinces Bac Kan and Thai Nguyen.

3. Research to manufacture the electrochemical nano sensor controlled by computer to determine the Hg(II) traces on field.

4.Simultaneously determination of As(III), As(V), Monomethylarsonic (MMA) and Dimethylarsonic (DMA) in well-water and urine by HPLC-ICP-MS in some locals.

5. Research to use heating tube to increase the heat absorption from the sun and combine to heating pump to supply heated air for drying process with lower energy expense.

3. Technology Applications and Deployment

3.1. Development and Application project cooperate with provincial, ministries

I. Research, organizer application and development technology in the province and ministry

Continue 6 projects and start 12 new projects with the total budget is 13,515 billion included 3,15 billion VND from vast and 10,4 billion from provincial.

There are 8 provinces which joined to carry out project, included: Quang Nam, Ben Tre, Phu Tho, ha Tinh, Thai Binh, Thua Thien Hue, Hai Phong.

In management, VAST cooperate with provincial through Ministry of Science and technology to identify objectives, contents, and output to evaluation, and transfer the project output. The project have been carry out by demand of provincial, so that they solve the real local problem, and project results have been applied, transfer to local organizations in multi scale. The cooperated provincial highly appreciate the result of those cooperated projects with VAST.

However, the cooperation project has some difficulty because of the projects must have output application product, in two years with limited budget. The application usually is in rural area, difficulty in transportation, so that not many scientific register to carry out this type project.

There are many projects, pilot production project which have been carried out in over 40 provincial and ministries. The result is highly application, and has been transfer to local provincial and factories in year 2012. In addition those projects have been funded by the provincial and factories (Budget from VAST is 6 billion, from counterparts is over 16 billions).

There are 58 projects which cooperated with provincials, ministries in year 2011-2012 with total budget is 41,888 million, in with the 13,298 million VND is budget for 2012. Year 2012-2013, there are 49 projects have been approval, total budget is 43,639 million, and 16,096 million VND is budget for 2012. Almost project focus on agriculture, environment and produce specific products for local satisfy. Many of them have been transfer to local, which have been highly appreciated, and sever local demands, which has been multiply.

3.2 Pilot production project

Continuous two pilot production projects with budget is 550 million, develop 8 new pilot production projects with budget is 2400 million. From 2011, the pilot production project have not been taken back the budget so that number of projects have been raised up, 2 projects in 2011; 8 project in 2012 and 9 projects in year 2013. However those projects are in small scale, effect in narrow field.

3.3. Unscheduled scientific mission for local

Base on the demand of local, VAST organized some unscheduled scientific mission to solve the real problem which has been highly appreciated of locality.

Organize a group of Scientifics to study and assessment stranger religion phenomenon in Cam Chau, Thai Thuy district, Thai Binh province.

Build and setup 5 earthquake stations in North Tra My for observe and study earthquake in area

Organize the science committee to assess the projects "Wider metallurgy factory in Lao Cai"; "Technology of mud refine to produce yellow phosphorus in Tang Long, Lao Cai" and "Technology of apatite ore factory III Lao Cai"

3.4. Develop the application program in national and regional scale

Continuous to build Pilot of pharmaceutical chemistry based on cooperate to Ho Chi Minh City and national pharmaceutical chemistry. The proposal has been present in National science committee and the documentation has been submitted to Ministry of Commercial and Industry.

Build program of "Exclusive Innovation project", preside by Ministry Planning and Investment, funded by World bank.

Build program science and technology for development socio and economic in Northwest region province.

Cooperate with 6 provinces in south west region to develop program modeling of climate change in district level for 6 provinces in Mekong delta".

3.5. Cooperation with provincial, ministries

- Cooperate with Yen Bai People committee and North-west region Direct Board to organize the workshop on Science and technology to develop North-west region socio and economic.

Picture of participation of Tay Bac workshop, Yen Bai

- Participate the Science and technology show in Ha Tinh province; preside by Ministry of Science and Technology.

- Organize the signing ceremony of agreement on scientific and technological cooperation between VAST and Lao Cai Provincial People's Committee in Lao Cai province.

- Prepare to sign with Ho Chi Minh City People's Committee ceremony of agreement on scientific and technological cooperation during 2013-2017.

- Agreement with Dong Thap province to manage My An station to develop the Application technology for VAST in Dong Thap Muoi region.

3.6. International cooperation on technology application

- Cooperation with Belgium to organize workshop on "Human and economic development: technology transfer as key players".

- Cooperation with Global Research Alien to organize workshop on Braimstorming session and Project scoping inclusive innovation" in 25-26/7/2012 in VAST.

- Organize 2 exchange research group ot Korean and China in order to build and setup pharmaceutical chemistry pilot laboratory.

- Organize 2 workshops to setup Exclusive Innovation Projects, there are 40 proposals have been setup and submit.

3.7. Techmart

Participated International Techmart 2012 in Hanoi, VAST has 11 exhibition counters. There are 7 institutions in VAST participate Techmart 2012 included: Institute of Biotechnology, Institute of Environmental Technology , Institute of Chemistry, Institute of tropical technology , Institute of Information Technology, Institute of Material science, Institute of Applied physic and scientific instrument; VAST have been given 8 golden cup from Techmart Organization board for good productions.

3. 8. Scientific - Technical Services Contracts (without the State Budget).

In 2012, subsidiary units of VAST have signed Scientific - Technical Contracts with a total budget of 151 billion VND, increasing 30 billion VND compare with 2011. The Units carrying out contracts of large values include: Institute of Geography (17,4 billion VND); Institute of Applied Mechanics and Informatics (17.7 billion VND); Institute of Environmental Technology (14,6 billion VND)... . These are the leading ones in term of total budget for realizing contracts in recent years.

3. 9. Intellectual property activities

- In 2012, registering intellectual property of the Academy has increased in terms of both quantity and quality, of which, 07 inventory custodies, 05 useful solutions, 01 goods trade.

However it is not corresponding to potentiality of VAST, it really need a sollution.

4. Education and training activities

The Vietnam Academy of Science and Technology (VAST), a leading scientific and technological agency of the country, has an important position in the national scientific and technological system, and conducts basic research on natural sciences and comprehensive and high-standard technological development. The

2012 is the first year in long term plan to 2030 “advanced project for development of the VAST up to 2020 and orienting to 2030”, it was approved by the Prime Minister in the end of 2011. VAST is always ready for its high-standard technological and scientific potential to satisfy arising issues in factual situations and train high-standard scientific and technological human resources for the country.

Derived from the common political tasks of VAST in recent years, VAST is always interested in the training of high-standard (PhD, Master) for his unit and common service country. In 2012, all units were training 392 doctors and 269 masters of the different expertise in the field of natural science. Units in VAST also have sent many of his young staff to abroad to supplement the force of high-standard officials.

Overall, the organizational of VAST is quite stable, complete and synchronous staff high-standard and are quite large in most fields of natural science. Force high-standard staff is always strength of VAST in recent years (compared with other research units and development as well as universities in the country).

4.1. Results of postgraduate training achieved in 2012

In 2012, 19 Institutes under the VAST (there is a new Unit) are engaged in postgraduate training and maintaining and further improving the quality of postgraduate training under the new regulations. Of the teaching staff are very enthusiastic in guiding the PhD training. To implement the new regulations of the state, the institute has developed and promulgated regulations on training doctors, under the guidance in Circular No.: 10/TT-BGDDT dated 05/07/2009 of Ministry of Education and Training held a series of measures and management training institutes have been set. The main purpose of these measures is to ensure the quantity and quality of students allowed to institute specialized training doctors and international standards.

Total of 392 PhD and 269 graduate students, including 60 PhD has successfully defended his doctoral thesis and 170 graduate students defended master thesis. Number of PhD and graduate students is increasing every year, is expected in 2013 will train 454 PhD and 199 graduate students. In 2012 has written 23 textbooks and 26 in 2013 proposed curriculum.

From the results of the practice of the Institute under VAST achieved shows the training and retraining of VAST initially meet the requirements was to ensure and improve the quality of education postgraduate of the VAST. However, the initial training is facing many difficulties due to objective reasons and subjective in which bring prominence to the issue of funding for training VAST is very limited. Work competition faced many obstacles due to the specialized topic requires foreign language competition, the compulsory subject, time and equipment for training...is also one major cause of difficulty in developing and implementing training plants of the VAST.

Besides, the master's program affiliated with the Universities: University of Natural Sciences – National University of Ho Chi Minh City, Thai Nguyen

University, the Institute also Ministry of Education and Training for implementation of the scheme master's degree International (911).

Overall, the application of the Regulations and Procedures training of VAST issued in enrollment has brought the issue to success in choosing the candidates selection. However, the selection criteria are also gradually be completed as early in the admissions process, regulation of compulsory subject, the time course study (subjects case studies, thematic studies, workshops...) and procedures for the output of Dr...

With the mission of building up human resource with international-standard-competencies, increasing the effectiveness of postgraduate-education activities by combining the research activities and education, VAST had promoted the establishment of Graduate Academy of Science and Technology. This plan was approved by the Prime Minister in the "advanced project for development of the VAST up to 2020 and orienting to 2030". The establishment of Graduate Academy of Science and Technology will bring the postgraduate-education of VAST to a higher level, promoting the development of the leading experts on natural sciences and technology in the period of globalization today.

4.2. Human Resource training activities

In 2012, VAST sent a number of staff to participate in the training of political theory, state management and professional knowledge to initially meet the requirements of preparations; improve knowledge, management skills and profession skills for human resources of VAST. Below were the details:

Training in political theory and State administrative management knowledge

VAST sent 15 leaders and managers to attend administrative- political theory senior class in service for the Party Executive Committee of Central agencies Session II (2012-2014); sent 78 officials to attend State management knowledge training of main expert program and 47 officials to attend State management knowledge training of expert program

VAST co-operated with Hanoi University of Home Affairs to organize "Enhancing human resources management capacity training class for public administrative agencies". The class was organized in order to improve the skills, analysis, determination of career position and human resource planning, description of the job and recruiting skills in State agencies, especially the examination according to the job title and job position. Through the class, general management office and experts doing the job of human resources organization from 36 units of VAST obtained useful knowledge which directly related to their duty, contributing to the efficiency of dealing with the given work.

Training in knowledge of international economic integration: VAST organized a world economic integration class for staff leadership and equivalent or higher, officials from the main researcher session and equivalent or higher with a total of 170 officials

Professional training: Based on the job requirements, VAST organized a professional training Conference of human resource organization and personnel for

staff leadership, function Board, leaders of specialized research institutes, leader of general management office and officials specializing in organization at VAST units. Total number of officials who were trained the professional organization and personnel in 2012 was 145

Abroad training: Implementing the plan of training staff and civil servants overseas, VAST successfully organized the training course of human resource management of science, technology and science, technology management at the University of Osaka, Japan with a total of 20 officials who are leaders, managers and experts to help the VAST's President, staff leadership of general management office and experts in charge of the organization and staff at the units

In general, the training of the officials at VAST was closely associated with the planning of leaders and managers at all levels of the Academy and at the same time follow of the objectives of the training plan for the officials and public servants which was approved by the President of the Institute.

5. International co-operation activities

2012 is the year the world faces many big challenges, such as economic crisis, the increased gap between the rich and the poor, biodiversity loss and degradation of natural ecosystems, ... In the situation of global- happening international integration, to actively participate in the international integration of science and technology, on May 8, 2012, the Prime Minister approved the "International Integration scheme in science and technology by 2020". Vietnam and Laos celebrating 50 years of establishment of diplomatic relations (05/9/1962 - 05/9/2012) and 35 day signing the Treaty of friendship and cooperation is an important event in the international cooperation relations with neighboring countries. Before the changes of the world and the major events of international relations of the country, more or less there are impacts on the international exchange activities of the Institute.

2012 was the year when the Institute accepted many delegations from organizations around the world to visit and work, and at the same time organized many delegations led by the Institute's leaders to work with foreign scientific institutions. 2012 was also the year the Institute began to upgrade the task of bilateral international cooperation to the task of VAST international cooperation.

The orientation of international cooperation activities of VAST in 2012 pointed out the necessity for selecting partner, priority areas to focus the talents and human resources to develop international cooperation of VAST. In 2012, VAST organized 27 scientific delegations to visit and work with foreign partners, including the President and Vice-Presidents together with Directors, Deputy Directors leading 8 Groups of scientists to work with big international organizations such as the Russian Academy of Sciences, Belarus Academy of Science, Astrium group of France, National Aeronautics and Space Administration of the United States (NASA), Japan International Cooperation Agency (JICA), International Institute for Applied Systems Analysis (IIASA) in Austria....The remarkable point is the visit and re-sign the cooperation document with Russian Academy of Sciences of VAST's President, in which the two sides agreed to strengthen the

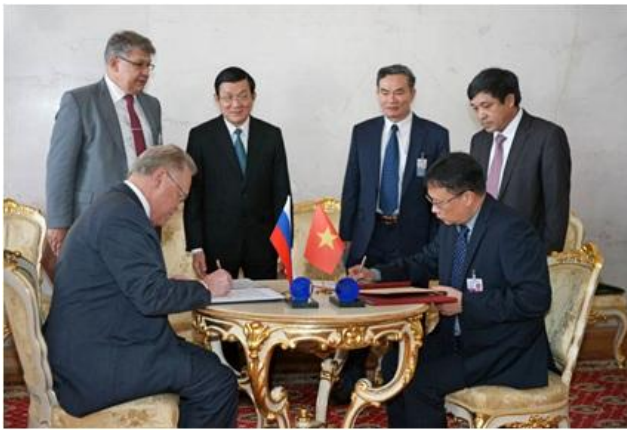
cooperation in training activities, exchange of the researchers, especially to strengthen the co-financing to the implementation of joint research projects.

The visit to NASA of VAST group lead by Prof. Chau Van Minh, President of the Institute in order to assess the cooperation results of the scientists between the Institute and NASA achieved and at the same time to focus on the central cooperation in the future as well as to conduct general research programs, to exchange photos, satellite data and to enhance capacity training for the Institute in the areas of satellite research, earth science, to participate in the program integrating satellite observations, surface data and forecast models to monitor and forecast environmental changes, improve the prevention ability, reduce the disaster and bring benefits to society (SERVIR). The way that Leaders of the Institute visited and worked with leading scientific institutions from many countries proved that the international cooperation activities of the Institute have begun to focus on key partners to take advantage of their strengths, strengthen the implementation the fields of key science and technology.

In 2012, There were 43 scientific and technology groups the Academy, the scientific institutions and international research centers from Laos, Japan, Korea, Russia, Germany, France, Argentina, Cuba and the U.S. to work with VAST in the field of environment, energy, biotechnology, marine natural resources survey, biodiversity and conservation, information technology, space technology, materials, chemistry, physics and mathematics ....

On 12.10.2012, the General Director of NASA, Charles F. Bolden, Jr. visited and worked with the Institute, which proved the enhancement of mutual understanding and trust, the development strategic partnership relation for space science research between VAST and NASA, contributing to the " Research strategy and space technology application to the year 2020 " of the Government. The two sides discussed potential cooperation areas in space science and technology, bring the cooperation relation between the two institutes to a new level. He expressed his wish to promote further space technology cooperation relation between Vietnam and the United States, especially satellite technology application to observe the natural resources, environment and natural disasters.

Besides the implementation of international cooperation activities in the signed documents, the signing of new international agreements are also concerned by the Institute, in 2012, VAST signed two extended Memorandum of Understanding and signed 7 new international agreements. The signing of the new documents showed that, the orientation of expanding new partners from potential countries has caught VAST’s interest, this is also consistent with international integration period which is going on global in general and in countries in particular



VAST's President and President of the Russian Academy of Sciences re- signed a cooperation agreement with the Russian Academy of Sciences period 2012 - 2017 during the President Truong Tan Sang's Russia Visit

VAST's President led the staff to work with the National Aeronautics and Space Administration of the United States (NASA)

Princess of Belgium attended the workshop The important role of agencies through transferring the technology in the relationship between human development and economic development

The Laos' Minister of Science and Technology, Prof. Dr. Boviengkham VONGDARA visited and worked with VAST

14th Do Son class between VAST and CNRS held at Do Son; Prof. Nguyen Dinh Cong, Vice - President of VAST awarded scientific certificates for students attending the class

To maintain and promote the international cooperation activities for international science and technology organization, in 2012 the Institute spent a considerable amount of money ($ 64,745) to pay yearly for organizations such as Dubna, AUF, APCTP, AASA, IUGG, PSA and CONFRANSIE. The Institute also rewarded timely the foreign scientists and international scientific organizations who had significant contributions to the training and scientific research career of the Institute as well as conducted the procedures of Friendship Medal for the scientists of Russian Academy of Sciences, awarded honorary Doctorate for President of Russian Academy of Sciences, Japanese scientists, collaborated with organization and personnel Board to carry out the procedures of awarding VAST's medals for 18 foreign scientists on the occasion of the 90th anniversary of establishment of the Institute of Oceanography and the 25th anniversary of the establishment of the Institute of Geophysics.

6. Activities of Key Laboratories at VAST

Four Key Laboratories at Vietnamese Academy of Science and Technology (VAST) always ensure performing as open lab, where implement variety of themes, topics and tasks at all State or Ministerial levels.

In 2012, four National Key Laboratories (Gene Technology, Plant Cell Technology, Materials and Electronic Components, Network and Multimedia Technology facilities) in VAST assigned to perform four State independent scientific tasks, including 2 forwardings (2011-2012) and 2 new openings (2012-2015).

Besides the state independent scientific tasks assigned directly to National Key Laboratories from Ministry of Science and Technology, each Key Laboratory selects implementing several new topics according to the function of Key Laboratory. The number of tasks and themes of each key laboratory in 2012 as follows:

- Key Laboratory of Gene Technology assigned to perform two state independent tasks and 4 scientific themes according in function of Key Laboratories;

- Key Laboratory of Materials and Electronic Components assigned to perform a state independent task and 5 scientific themes in function of the key laboratory;

- Key Laboratory of Plant Cell Technology assigned to perform a state independent task and 3 scientific themes in the function of Key Laboratories;

- Key Laboratory of Network technology and Multimedia made 3 scientific themes in the function of Key Laboratories;

Totally, 15 scientific themes are implemented in four Key Laboratories in VAST during 2012.

The implementation of scientific themes and tasks:

All scientific themes and State independent tasks of four Key Laboratories have made progress, follow the content outline has been evaluated to achieve the goal of subjects.

Also in this year, four Key Laboratories organized assessment and reviews themes, topics according Key Laboratories functions ended implementation 2010-2011 and 2011-2012 periods. The topics and tasks have been implemented on schedule; full of the scientific content has been evaluated and approved. All scientific themes were accepted.

The scientific themes and State independently scientific tasks of the 2011-2012 periods have been implemented according to schedule ensure the implementation of all the scientific content approval.

The themes in the function of Key Laboratories carries out normally in two years, however, there are some themes done in one year only.

The scientific themes and tasks are implemented according to schedule, ensure the implementation of all the approved scientific content (statistically the results of the topics included below).

The topics and tasks implemented in four National Key Laboratories are sticking to the approved estimates and the assigned targets.

Many scientific teams working at Key Laboratories have got collaborative research, trainings and coordinate with other agencies in the country and abroad (for example as Training workshops for Laos' scientists).

Many young scientists have got PhD thesis upon the scientific directions of the Key Laboratories. Many doctoral and Master dissertations have been completed here. Many papers have been published in specialized domestic and international scientific journals.

Functionally key laboratory themes were implemented comply with the plan, to obtain the quality requirements as registered. The research results have significant scientific and practical application ability.

Results obtained in the study of the subject State independent scientific tasks in 2012 was to facilitate the implementation of research in the next year; research topic often results in 2012 and previous years, have created favorable conditions for the direction and development of new ideas proposed to register the subject at all levels of management.

Budget Allocations in 2012:

Funding in 2012 to support regular operations of Four National Key Laboratories is 6.550 million VND, up 30% compared to the 2011 budget (5.040 million VND) and has allocated specifically for each laboratory by Ministry of Science and Technology as follows:

- Key Laboratory of Gene Technology: 1.750 million VND

- Key Laboratory of Materials and Electronic Components: 1.750 million VND

- Key Laboratory of Plant Cell Technology: 1.750 million VND

- Key Laboratory of Network technology and Multimedia: 1.300 million VND

On the basis of the funding for activities per each National Key Laboratory, Key Laboratory's Director and Director of the Host Institution shall uniformly distributed in accordance with the specific requirements of each one.

Funding to support regular operations, activities of four National Key Laboratories for perform topics according to Key Laboratory's functions, payment of electricity, water, repair of equipment, purchase of spare parts...

Equipment utilization situation:

The research achieved good results thanks to modern equipment of four key Laboratories. All equipment are operating with very high frequency like sequencers, PCR and Real-time PCR, mass spectrometry, high-performance liquid chromatography (HPLC), liquid chromatography purification (FPLC), the centrifuge, micro-array system, the 2-Dimensional electrophoresis, equipment for sample preparation of protein analyzing, spectroscopy and fluorescence microscopy - scanning electron microscopy (FE-SEM), X-ray diffraction system, the Raman scattering and some instrumentation system for studying optical properties of the material (measured fluorescence absorption system). Overall, the equipment of the four National Key Laboratories is put into operation as soon as finally established.

Thanks to the modern Key Laboratory's equipment, scientists of VAST have good conditions for registration, bidding and implementation of a variety of projects belonging to State Science and Technology Programs, National Target Programs; National Foundation for Science and Technology Development (NAFOSTED), Basic research oriented Applications, etc...

Due to modern equipment of Key Laboratories, many research groups in specialized research institutes have developed good topics and tasks, coordinate training and international cooperation, contributing to published several articles in international reputation journals, with highly Impact Factor (IF).

The training and education:

In addition to research topics, science and technology tasks, staff of four National Key Laboratories also involved in teaching and training graduate students, high school students are staff working in agencies within and outside the VAST. Many young scientists doing his doctoral thesis, masters research directions of four National Key Laboratories. Many projects have been published in scientific journals specialized national and international. Graduate students, high school students used the devices of four National Key Laboratories in-depth studies.

The Plan for key laboratories in next 2013:

- Continue to implement the recommendations of state-level independent lab communicate directly when assigned by the Ministry of Science and Technology key indicators tasks.

- Implementing scientific themes by function of the Key Laboratory

- Maintain effective exploitation and maintenance equipment, maintenance and repair of some equipment from the budget support in 2013

- Recommend The Ministry of Science and Technology to support additional funding for maintenance and repair of equipment and implementation of themes, tasks in order to exploit more efficient operation of the Key Laboratory.

7. Publishing, Museum and Information activities

7.1. Publishing activity

Publishing scientific and technological works in the form of Science journals, Monographic Books, Reference Books, Textbooks, etc is among the important scientific and technological functions of the Vietnam Academy of Science and Technology. With its large team of scientists, each year it has hundreds of books, thousands of articles published in 12 journals specialized for science and technology, and hundreds of articles published in international journals with ever-increasing quality.

7.1.1. Publishing scientific and technological journal

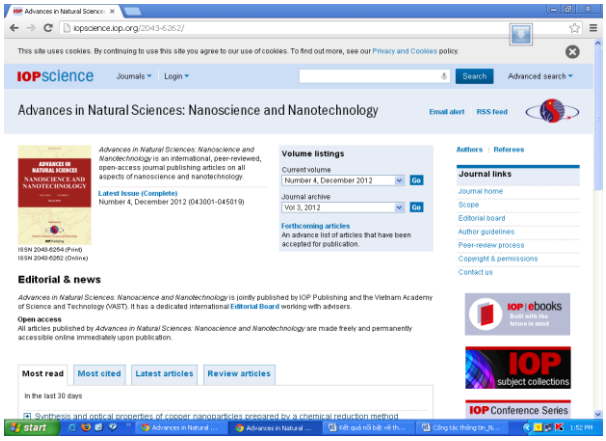
Currently, VAST is publishing 12 journals specialized for science and technology. These are widely-read journals recognized and licensed by the government. Several journals have been upgraded from being published in Vietnamese to being published in English such as Vietnam Journal of Mathematics, Vietnam Journal of Mechanics, and Communications in Physics and Advances in Natural Sciences: Nano Sciences and Nanotechnology. The Vietnam Journal of Mathematics has received the cooperation of Springer Publishing House of Singapore to be published internationally for years. Quality of the journals is improved year after year in terms of content, form, quantity and frequency of publication, etc. This improvement has helped meet the demand of publicizing the scientific research results of domestic and foreign scholars and scientists.

The editorial boards of the journals consist of leading scientists in universities, academies and institutes nationwide. The editorial boards of some journals are also sat by foreign scientists from UK, France, Russia, etc.

Articles published in the journals are all of scientific value and precise with copyrights following the current regulations of the government, and those of the editorial boards. Normally, an article must undergo strict assessment, evaluation, editing and review to ensure its scientific quality and other requirements of the editorial boards before it is published.

Facing requirements of integration and development, In 2010 VAST decided to invest in upgrading publishing its 12 journals under the international standards of journal, has been striving for having at least 1 to 3 journals get the international standards (ISI.) by the 2014 These are the Journal: Advances in Natural Sciences: NanoSciences and Nanotechnology (ANSNN), Acta Mathematica Vietnammica, and Vietnam Journal of Mathematics. The year 2011 is the second year Electronic Journal of ANSNN to be published under the cooperation agreement with IOP Publishing, number of its access is very significant (there were 500 downloads of ANSNN content and each article downloaded an average of 286 times in 2011,

bring the total of download up to 47.000 times), and many customers have been interested in ordering the print works.



ANSN image on the IOP website

VJM image on the Springer website

7.1.2. Publishing scientific and technological book

In addition to publishing periodical scientific journals, VAST slates every year a special fund for publishing scientific works in the form of books.

A Monographic Book Volume has been continued to publish, it is divided into 4 fields:

- Monographs within the field of technology and technological development
- Monographs within the field of natural resources and environment of Vietnam
- Monographs within the field of sea and marine technology
- Textbooks for training graduate and postgraduate education.

The monographs are selected and published are the results of one field of science and technology by the author or the co-authors after many years of research, summarization, they were enhanced to theory in the higher range and highly appreciated in the term of science by scientists and managers. Their form is presented consistent, printed with high quality and solemnity. After publication, the PST has released to the required addresses, according to the plan a set of book will be published about 5-10 books per year, and respectively published 07 monograph, books in 2011.

To continue publish a set of book on the Vietnamese Sea – Islands. This is ordered by the Government which VAST has the strong point. By the end of 2011 the set of book was published 20 books in the fields related to the sea and islands. By the assessments of scientists and other readers, it has high scientific value and is very useful in popularizing and improving people's knowledge about the marine sector, contributing to National Sea Strategies up to 2020.

- In 2011 implemented registration the publishing plan including 18 times of 130 book titles. Granted decision of publishing for works that enough standards under

the criterions in accordance with principles and objectives of the PST, permitted by Government agencies. There were not any errors in publishing works in 2011.

- PST continued to participate in Vietnam Book Award and won the high prize: These books are Earthquake Tsunami, author Prof. Dr Bui Cong Que and Atlas of Vietnam Insects, the author Dr. Nguyen Xuan Thanh, Prof. Doctor of Science. Vu Quang Con won Silver Prize.

7.1.3.Orientation of publishing activity for 2012 and the follow years :

- Maintaining the publication of 12 specialized journals with incremental improvement in content, form and print quality.

- Continuing to invest in upgrading the quality of three English language journals, which are the Mathematics and Advances in Natural Sciences: NanoSciences and Nanotechnology and Acta Mathematica Vietnammica journals, particularly Acta Mathematica Vietnammica journal has been striving for getting the international standards (ISI) after the year 2014.

- Continuing to publish monographs in the Monographic Book volume following the strengths of the VAST.

- Participating in publication of books per orders of the Government for the National Bookcase, especially in fields where VAST is apparently strong such as books on sea and islands, natural resources and environment, and basic research.

7.2. Museum activity

7.2.1. Vietnam National Museum of Nature's activities

a. Research activities

In 2012, Vietnam National Museum of Nature (VNMN) performed 02 tasks given by the Government, 04 national projects (01 protocol and 03 projects of Highlands III programme), 06 projects of ministry level (04 projects of Nafosted Fund) and 06 projects of Vietnam Academy of Science and Technology (VAST), 02 bilateral cooperation projects and 05 of institutional level. Notably, VNMN has started performing project "Building the national specimen collection on Vietnam Nature".

These tasks and projects have been actively implemented and completed as planed. Of these, 02 projects of ministry level and 01 of VAST have been completed and going to be accepted. The results of these projects have been posted in the ISI journals. Museum's staff published 15 international articles (SCI, SCIE and ISBN), and 03 articles were published in the Journal of Science and Technology in domestic.

b. Implementation of the tasks given by Prime Minister:

**) Performing the task of planning the Vietnam National Museum of Nature system according to the Decision No. 86/2006/QD-TTg dated 20/4/2006 of Prime Minister:*

Implemented Regulation on coordination between the members in the system, which was enacted in 2011 by VAST's President, the VNMN sent the delegation to museums in the system to support deployment tasks under the Deision No.86. Supported and counseled for the Geological Museum, Forest Resources Museum,

Do Son Oceanographic Museum to build and implement the plan in accordance with the development plan of Vietnam National Museum of Natural Systems to 2020.

Advised Dien Bien People's Committee to hand the plan of building the Natural Museum in the Northwest region to the Department of Agriculture and Rural Development. Supported, and helped Dien Bien Department of Agriculture and Rural Development to build plans and submit to Dien Bien People Committee for approval.

Advised Lam Dong People's Committee to build and submit the project of building the Museum in the Northwest and approved by the provincial People's Committee.

Successfully organised the seminar "Coordinate implementation on collection of specimens for the Vietnam National Museum of Nature in Do Son, Hai Phong on 09-10/8/2012. Participants in the workshop including representatives of the following agencies: Court, Execution, Investigation Police, Environmental Police, legal support Police and other management bodies of the districts, suburban in Hanoi, and some member museums in the system.

**) Implemented the task of specimens collection for VNMN (under the direction of Prime Minister in Document No. 611/TTg-NN, dated 16/5/2007).*

In 2012, VNMN implemented 32 times of specimens' collection and reception from localities across the country and Hanoi. VNMN also received 58 specimens including many rare specimens such as 05 Molamola (weight from 15 kg to 400 kg) from coastal fishermen in Quynh Luu district, Nghe An; 01 dolphin bones from Duong Dong, Phu Quoc; some Tiger samples (from Quang Binh provincial police, Hanoi zoology, Nghe An provincial police, the people's Committee of Tam Diep, Ninh Binh province, Bac Ninh Execution, Execution of Hanoi), received many samples from Ha noi Zoology and Wildlife Rescue Center and Forest Protection Technique, Soc Son, Hanoi, including Tiger, white chicken, squid, large land turtles ..

- Processing 7 samples including skin and bone, pre-treated over 20 samples to put into storage for processing, including Dugon, Molamola.

- Successfully processed 02 stuffing skin holotypes and 02 freshwater fish bones samples in the institutional project.

c. Resources construction:

*) Implemented the project "Organism Evolution Exhibition Room": The project has completed basically as expected in 2012 with the implementation of the following categories: construction and preparing the exhibition room, supplying and installation of equipment for display; supplying and installation of phylogenetic tree; installation of 3D-movies equipment; collection of specimens domestic and abroad; and other investment items: anti- termite, installation of air-conditioning, alarm, anti-theft and camera for observing with budget of 12 billion in 2011 - 2012 from the cultural resource fund.

*) Implemented the project "Building the National Specimens Collection on Vietnam nature" with total investment of 340 billion in the period 2012-2015. In

2012, VNMN has granted more than 9 billion (0.8 billion from Science and Technology capital, 7 billion from development and investment career and 1.7 billion from cutural career source). VNMN has deployed 03 component projects, of which 02 projects of science career source.

d. Results of international cooperation, training, information and publishing:

VNMN signed memorandum of understading and agreement with the University of Science and Technology Kumamoto, Ibaraki Museum, Japan, and signed agreement to exchange samples and processing expert with the St. Petersburg Zoological Institute. VNMN organized many field trips cooperated with foreign experts: Britain, China, Sweden, United States, Italy, sent 06 staffs working abroad and 02 officials to the Federal Republic of Germany and Japan to study the doctor course, through the international activities, VNMN can train many researchers and collect many specimens for the Museum.

VNMN received processing expert team from the Federal Republic of Germany to learn some new methods of tanning and manipulated animal models, creating good relationships of exchanging experiences in terms of specimens processing.

VNMN received and had discussions with 02 leaders of the Saint Petersburg Zoological Museum about specimen exchange, whereby Saint Petersburg Zoological Museum will donate to VNMN some precious and endemic specimens of Russia. These samples will be transferred to Vietnam in 2013.

7.2.2. The museum's activities at the Institute of Oceanography

This is a specialized museum with 100 years of age, Nha Trang Museum got the following results:

- Carried out to make the new tables system in the Museum. Maintained and preserved specimens (added preservatives, made the label, replaced the cans, jars preservation, etc.) for 1000 sample jars and added about 100 small sea creatures of all kinds. Organized and put into operation on theme "Sharks "

- Completed the draft project proposal: "Building marine sample collection in South Vietnam" this is a part of the project "Building National Specimen Collection on Nature".

- Organized to lecture students from many Universities: University of Tay Nguyen, Hue university of Science, Can Tho University, the University of Natural Sciences in Ho Chi Minh City, etc.

- In 2012, Nha Trang Oceanographic Museum recieved approximately 286,000 visitors to observe and study, in which domestic is about 276,200 and 10,182 foreigners.

7.2.3. The museum' activities at the Institute for Marine Resources and Environment:

- Received decision No. 1891/QD-UBND MPC on 5/11/2012 to be granted 12 hectares of land in Bang La Ward, Do Son district.

- Project Management Board implemented the project as planned, completed general plan for compensation and site clearance.

- Received approval decision of compensation and clearance plan of land with the total budget of 37.5 billion.

- Budget of 16 billion in 2012 will be used for site clearance and compensation for 69 house holders.

Some activities' images:

<table>
<tr>
<td> 

Seminar: Coordinate implementation the Prime Minister's direction in Do Son, Hai Phong on 09-10/8/ 2012</td>
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Conference to review task of implementation planning Vietnam National Museum of Nature system on 17/12/2012.</td>
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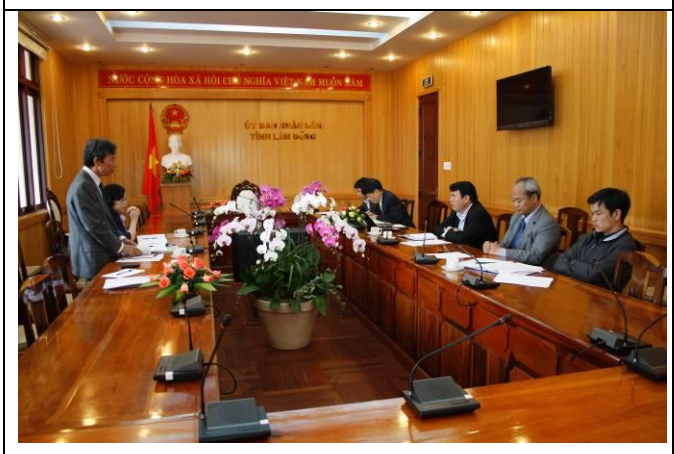
<td> 

Work with Vice President of Lam Dong on Central Highlands Museum project Da Lat, 12/2012</td>
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Dolphin skeleton collection at Phu Quo, 12/2012</td>
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7.3. Information Activity

8After effective operation of the digital library since 2009; in 2011 the project "The proposed list for VAST's foreign Scientific and Technical journals in the period of the years 2011 -2015" has been implemented with the conversion of a large number of foreign Scientific and Technical printed journals into electronic ones and has increased purchasing the access rights of some high - quality databases, namely: ScienceDirect database from Elsevier Publishers (including 1,800 electronic journals of science and technology in full - text have accessed since 1995), SpringerLink database (including over 1,200 electronic journals in full text have accessed since 1997), a collection of 34 journals of the American Chemical Society (ACS), a collection of 66 electronic journals of the British Institute of Physics (IOP),... The year of 2012 was the second year of implementing project that served the VAST's researchers very well with more than 68,000 full-text journals downloaded, of which,

+ 46,575 full-text journals-views have been loaded in ScienceDirect database and the mostly subjects of geology, marine geology, mathematics, informatics, chemistry, geochemistry…

+ 7,725 full-text journals-views have been loaded in the SpringerLink database and the mostly subjects of plant cells, biotechnology, cell biology, microbiology, mathematics....

+ 5,858 full-text journals-views have been loaded in the collection of 34 electronic journals of the American Chemical Society (ACS), and the mostly subjects of chemistry and agriculture, natural products, ...

+ 8,155 full-text journals - views have been loaded in the collection of 66 electronic journals of the British Institute of Physics (IOP) and the mostly subjects of Nano science, nano technology, optics and applied physics...

+ Besides, the large number of other full-text electronic journals also have been loaded by researchers in VAST such as the Directory of Open Access journals - DOAJ, Scirus, MetaPress, BioOne, Open J-Gate, ArXiv.org, Astrophysic Data System (ADS), E-print arXiv via Scirus, PubMed, Proceedings of the National Academy of Sciences (PNAS), CiteSeerX, BioMed Central,...

In order to improve the efficiency of the digital library, the disseminative programs on the electronic resources in the digital library were held at 28 specialized research institutions of VAST during the period of July to September, 2012 has received the response of the scientific staffs in VAST with the number of registered users increased in accessing digital-library and the number of full-text articles in a digital library are loaded on the increase during the period of August, 2012 to present. In 2012, over 4,200 valuable foreign scientific articles namely the journal about the chemistry of the Royal Chemical Society (RSC) and the automatic control of information technology (Automatic Control) have been applied to a digital library through endogenous digital repository updated by the library staffs to complement the scientific resources and database as well as summarize the results of the domestic scientific research constructed by the National Agency for

Department of Science and Technology Information (Ministry of Science and Technology) has been integrated into a digital library for research institutions of VAST.

The guide and dissemination Conference on digital library for scientists in VAST was held in Hanoi (May, 2011)

The website of VAST, http://www.vast.ac.vn/, has frequently improved and updated so as to enhance the security functions and ensure convenience for the users with 299 posts-written as e-news was published in 2012 (increasing of 42% compared with 2011), a number of audiences accessed in 2012 reached to 1,700,305 times (rising of 52% compared with 2011). After three years of official operation, the web of VAST became one of the most effective broadcasting channels to popularize the information of VAST's activities to numerous domestic readers as well as the foreign partners and has received various good feedback, appreciation of VAST's researchers and staffs as well as its cooperative offices and organizations.

8. ODA-funded satellite projects

8.1. The project "Vietnam natural resources, environment and disaster monitoring small satellite- VNREDSat-1"

Project Information:

Implementation peoriod 2010 – 2015; total ODA budget of 55,8 mil. Euro; counter capital (initial) of 64.820 mil. VND, of which 55,820 mil. VND for development investment capital, 9.000 mil. VND for public service delivery units).

Implementation Result

Assembly and integration of the VNREDSat-1 satellite has been completed, testing is on-going, foreseen to be finished in late 02/2013, and expected to be launched in 4/2013 by VEGA launcher operated by ArianeSpace (France) with ProbaV (by ESA) as main passenger.

Construction and equipment installation for ground facilities have been completed and put in to operation: the Operation Center located in 7th floor, 2H, Nghia Do; Upgrade of Remote sensing receiving station in the National Remote Sensing Center (MInh Khai, Tu Liem, Ha Noi); the Satellite Control Station in Hoa Lac Hi-tech Park; and its communication system: Nghia Do – Hoa Lac – Minh Khai and Astrium (Touluse, France).

Training: 15 Vietnamese engineers have completed their training in France, returned to Vietnama and operating the VNREDSat-1 system with supports from French experts.

The project is actively preparing for the satellite which is forseen to be launched in mid April 2013, 3 month ahead the approved schedule.

8.2. The 2nd project for natural resources, environment and disaster monitoring satellite (VNREDSat-1B):

Based on the official document no. 1044/TTg-HTQT dated 30/6/2011, the Prime Minister assigned VAST to complete the Project document, negotiation with SPACEBEL (Belgium), to organize for apprival and implementation of the Project. VAST President assigned the Small Satellite Project management unit to organize and implement the project. The project was approved by the Decision no. 621/QĐ-KHCNVN dated 17/5/2012, funded by Belgium ODA loan valued at 63 million Euro and 60 billion VND counter-capital; implementation period from 2013 - 2017. The main contents of the project are:

- Package no.1, 62,6 mil. Euro for: design, manufacture and launch of VNREDSat-1B satellite; provision of equipment, installation and trial operation of a X-band satellite receiving, processing and archive station; Provision of equipment, installation and trial operation of a S-band Satellite Control Station; procurement of launch service; launch and in-orbit insurance; Provision of equipment, installation for a satellite technology laboratory (located in Space technology Institute); Training and technology transfer on small satellite technology. This package has been approved, its bidding documents have been issued, its bids evaluation is ongoing the kick-off is foreseen in 2013.

- The project implementation supervision consultancy: 400.000 Euro.

- Establishment of its ground facilities: implemented by counter-capital, located in Hoa Lac Hi-Tech Park consisting of office, X+S band Station; infrastructure: water, electricity, communication and construction and equipments for the satellite laboratory in Nghia Do.

In 2012, the Project was allocated 3.400 million VND capitals for investment preparation. So far, the Project is actively preparing to be started in early 2013.

8.3. Vietnam Space Centre Project

02 November 2011 Loan Agreement for the implementation of Project of Vietnam Space Center has been signed by The Government of Vietnam and Japan. This is one of the biggest Science and Technology Projects in the recent 35 years. This is a key national investment project which will be the basis for the implementation of research, capacity development, utilization and international cooperation activities in space technology.

Vietnam National Satellite Center (VNSC) which is a research center under Vietnam Academy of Science and Technology was established on 16/09/2011 under the Decision 1611/QĐ-TTg of the Prime Minister of the Socialist Republic of Vietnam. VNSC receive, manage and implement Vietnam Space Center Project.

Vietnam Space Center is being constructed at Hoa Lac High-Tech Park from 2012 to 2020 with total investment of 54 billion Japanese Yen. The Project objectives are:

Establish the warning systems and strengthen the ability of response to the disaster and climate change, improve the management of natural resources and environment to develop the social economy and national security by developing and applying infrastructure and equipment for earth observation satellite.

To master the technology, produce its own small satellite of Vietnam at the request of "research strategy and application of satellite technology by 2020"; thereby promote the development of science and technology and promote high-tech industries related to aerospace technology.

The project contains 3 main components:

Building VNSC’s infrastructure (facilities and equipments) on area of 7 hectares in Hoa Lac High-Tech Park.

Technical transfer of satellite data image utlization; Manufacturing technology, integration, testing and satellite control and manufature 02 small satellites for Earth observation using SAR technology.

Capacity Development for the management of VNSC; satellite technology and space technology utilization.

Vietnam Space Center Master Plan

The basic requirement of the Project is to develop overall capacity to produce the second earth observation satellite in Vietnam after developing human resources through technology transfer of the first earth observation satellite abroad. These satellites, including the technology of development and application, are being utilized as means of prevention and mitigation of nature disaster and climate changes as well as nature resources management. This system must guarantee the observation of the earth in case of emergency under all weather conditions. The Project also considers the possibility of early development of Space Technology in Vietnam.

To meet the above mentioned demands, Vietnam Space Center Project formulates the following contents:

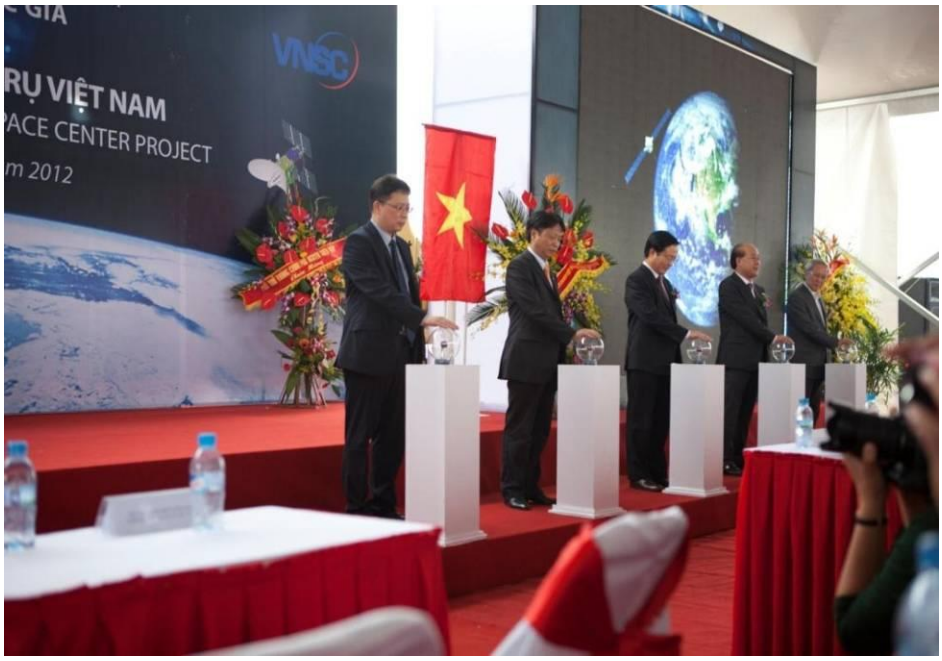
Ground preparation for the construction of Vietnam Space Center: 74.000m2 land leveled for the preparation of neccessary conditions to implement the next steps of the Project. Gradually build the facilities for research, develop and application of space technology of Vietnam to reach the world and region level.

In 2017, the first earth observation satellite named LOTUSat-1 will be manufactured, tested and launched in Japan. Satellite LOTUSat-2 will be assembled tested and accepted at Vietnam Space Center by its staff with the support of Japanese experts. LOTUSat-2 will be launched in 2020.

Vietnam Space Center Project is a complex high-tech project that Vietnam does not have many experiences. Therefore in order to ensure the quality of the project, it is necessary to use consulting services to supervise the implement of the project and help investor in the evaluation process of work acceptance. Besides, the

consultant has the duty to support investor in developing human resources for satellite data application.

The Ground Breaking Ceremony of Vietnam Space Center Project was successfully organized on 19/09/2012 which is an significant milestone of the Project lifetime and awarded one of the most 10 important events of Vietnam Science and Technology in 2012. The Project also receives the Certification of Investment from Project Management Unit of Hoa Lac High-Tech Park.



Ground Breaking Ceremony of Vietnam Space Center Project

Ground Preparation

President of Vietnam Academy of Science and Technology visits construction site

In 2012, the Project has received the approval of investigation and design work, project formulation and total cost estimation of component project "Ground preparation for the construction of Vietnam Space Center". Contractor has been selected to implement the component Project and the ratio of disbursement reaches 100% for 2012. The detailed design for Vietnam Space Center Project has been processed. VNSC honored to receive the Certificate of Ministry of Science Technology.

In 2013, it is planned to accomplish ground preparation works, submit for approval and implement main tasks of the Project.

The Project is being implemented on schedule. Project management process is being executed comply with the rules and regulations of Vietnam and Agreement signed between two Governments.

9. Investment to strengthen research capabilities and technology deployment

9.1. Present Infrastructure and facilities of VAST

Until the end of 2012, total properties of VAST (value of land not included) are approximately 392.294 million VND, of which:

- Housing: ~217,581 million VND
- Transport vehicles: ~7,303 million VND
- Other assets: ~167,410 million VND

About object:

+ *Total land area:* 142,500 m^2

Of which: - Land area for headquarters: 2,300 m^2

- Land area for experiements, research work: 1,947,000 m^2

+ Total building surface area ~150,000m^2

Of which: - Building surface for Research : ~125,000 m^2

- Building surface for technology development: ~15,000 m^2

- Building surface for bases, stations: ~ 10,000 m^2

+ 4 national key laboratories:

- Gen. Technology (Investment amount 57 billion VND)
- Multimedia and networking technology (48 billion VND)
- Electronic materials and devices (56 billion VND)
- Plant cell technology in the south (53 billion VND)

+ 1 Centre for high performance scientific computing (Centre for Information Infrastructure Development);

+ Many advanced scientific equipment for measurement, analysis and the field of physics, chemistry, mechanics, etc.

+ Cars: 74 pieces

The Academy's facilities and bases (land, infrastructure, office of specialised institutes, equipment etc.,) are invested with main purpose serving scientific research. Investment for Target of research and technology development is not commensurate. Since the end of 1990s and early of 2000's, The Academy made strong moves to equipment investment for research (average 20-30 billion VND per year) but just for deep investment and initial equipment. Investment for research and technology development is still limited.

9.2. Results of investment on facilities construction in 2012

Projects on facilities construction:

Three constructions are being urgently completed, which will be put into use in early 2013 as planned: the Central building (area of 7268 m^2; and 100 billion VNDs investment); research premise for Institute of Highland Biology (area of 3242 m^2; ~31 billion VND investment); research facilities for Institute of Tropical Technology (area of 3280 m^2; ~37 billion VND investment).

Central building

Sattellite control Station

Completed and put into operation the ground facilities for the VNREDSat-1 project including the transceiving station installed in Hoa Lac, the Satellite Operations Center at 7th floor 2H Nghia do and as well as the satellite image receiving station run by the Ministry of Natural resources and Environment and the communication system connecting the ground facilities (delivered in 17/07/2012), with the counterpart budget of nearly 55 billion VND (excluding the facilities installed and financed from ODA fund)

On 19/9/2012 the Vietnam Space Center Project funded by 2012-2020 Japanese ODA 54,400 billion yen, has been started with land area of 9ha located in Hoa Lac Hi-tech Park, and the ground is expected to be handed over to the Japanese so that the construction of the Vietnam Space Center will be started in late 2013.

Nghia Do Training and Service Complex were started in the area of 8500 m^2; valued >100 bil. VND. So far, its 7^{th} floor and structure has been completed valued at approximately 50 billion VND. The building is foreseen to be completed and delivered in late 2013.

Projects for renovation and repair:

Completion of the Project for receiving of transfer of the whole premise at 321 Huynh Thuc Khang, Hue allocated for Institute of Environmental Recourses and sustainable development in Hue, total value at ~11 billion. VND, comprised of: land of ~6.300 m^2 , 01 2-storey working office with area of 367 m^2, 02 workshops: more than 2000 m^2, 2-storey service building: 650 m^2 and fully equipped with electricity, water, fence, gate, parking place,…

Completed and put in to use two renovated buildings which are A25 (Institute of Nuclear Physics) and A26 (Institute for applied physics and scientific instrumentation) located in Nghia Do. These projects help remarkably improve the scene of the area, making the office more spacious, meet the requirements on

working area and condition for the two institutes, and contribute to complete the planning of the Nghia Do Research Area.

General assessments: in the situation of being impacted by the economic downturn; the Government, the National Assembly have issued resolutions and directives... to "tighten the public spending" in order to fight against inflation and stabilize the macroeconomy (the Government Resolution no. 11 in 2011, Detective no. 1792 by the Prime Minister on strengthening investment management ...) but the investment on VAST capacity building still weak with an increase of over 10% compared with 2011; regarding the investment funds, 2012 is the first year when VAST budgets was allocated from Education-Training and Culture sources (beside the sources for science and technology as usual). This demonstrated a significant concern of the State on VAST, and it is also a great success by VAST leaders for its development. The projects have achieved good results, compatible with the approved objectives.

Specially: in 2012 VAST was assigned by the Government to implement 3 big and important hi-tech ODA projects, in order to build and promote its infrastructure and capacities in research and application of space technology: Project to build the Vietnam Space Center; the VNREDSat-1 project; the second Vietnam earth observation system project– VNREDSat-1B.

All projects have been designed and approved and implemented in accordance with the State provisions; the ODA project: to guarantee the agreements with the donor. Prolonged and in-debt projects did not exist. On completion, the projects are put into use immediately and effectively.

10. Some important statistics

10.1. Statistics on Human Resources

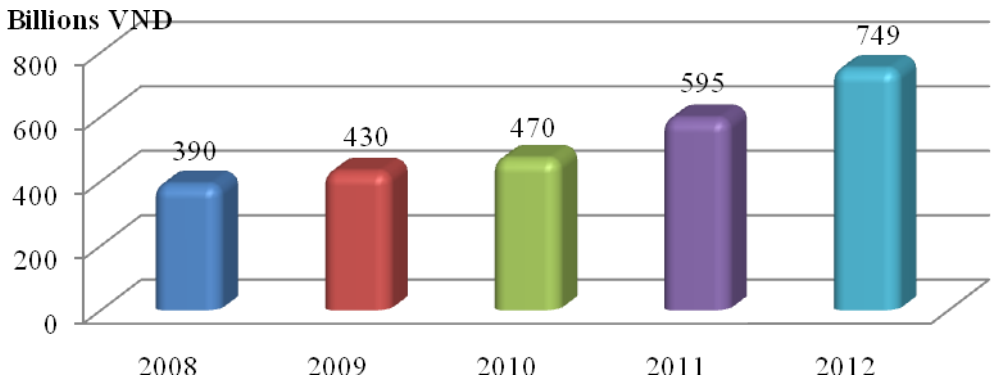
Qualification of Staff (As of 31/12/2011)

No	Institutions	Permanent staff	Contract signed staff	Title		Degree				
				Prof	Ass. Prof	Dr Sci	PhD	MSc	BA	Others
1	Functional departments	**46**	20	0	0	0	0	5	23	18
2	Administration office	**43**	17	0	7	0	11	8	24	0
3	People Party Office	**8**	5	0	1	0	1	0	7	0
4	Representative office in HCM city	**10**	5	0	0	0	0	2	3	5
5	Institute of Mathematics	**60**	10	14	13	15	30	9	6	0
6	Institute of Physics	**95**	26	6	11	2	48	22	21	2
7	Institute of Chemistry	**123**	58	2	18	1	57	26	32	7
8	Institute of Chemistry of Natural Product	**43**	25	0	4	1	15	13	12	2
9	Institute of Mechanics	**95**	29	3	8	5	23	37	27	3
10	Institute of Ecology and Bio. resources	**115**	45	0	9	1	37	39	35	3

No	Institutions	Permanent staff	Contract signed staff	Title		Degree				
				Prof	Ass. Prof	Dr Sci	PhD	MSc	BA	Others
11	Institute of Geography	**89**	43	0	5	1	24	28	33	3
12	Institute of Geological Science	**93**	31	0	6	2	35	26	26	4
13	Institute of Geophysics	**75**	21	1	5	1	17	23	21	13
14	Institute of Oceanography	**81**	23	0	3	0	15	29	27	10
15	Institute of Marine Environment and Resources	**43**	13	0	2	0	10	20	11	2
16	Institute of Marine Geology and Geophysics	**56**	22	0	0	0	15	18	21	2
17	Institute of Energy Science	**38**	13	0	0	0	4	12	19	3
18	Institute of Materials Science	**201**	63	3	13	2	53	58	75	13
19	Institute of Information Technology	**146**	29	2	12	1	29	43	72	1
20	Institute of Biotechnology	**153**	101	2	16	0	68	50	23	12
21	Institute of Environment Technology	**52**	21	1	3	0	16	22	13	1
22	Institute of Chemical Technology	**38**	12	1	1	1	14	13	8	2
23	Institute of Space Technology	**35**	11	0	1	0	6	14	12	3
24	Institute of Applied Informatics and Mechanics	**70**	14	0	4	0	8	15	43	4
25	Institute of Tropical Biology	**61**	20	0	1	0	11	28	20	2
26	Institute of Tropical Technology	**72**	26	0	6	0	20	25	20	7
27	Institute of Applied Materials Science	**39**	12	0	4	0	12	10	13	4
28	NhaTrang Institute of Technology Research and Application	**45**	15	0	1	0	9	17	16	3
29	Institute of Marine Biochemistry	**50**	27	1	3	1	17	12	19	1
30	National Satellite Center	**26**	8	0	1	0	2	14	9	1
31	Center for Scientific information	**31**	20	0	0	0	1	5	22	3
32	Vietnam National Museum of Nature	**29**	11	0	4	0	8	8	13	0
33	Publishing house for Science and Technology	**27**	20	0	0	0	1	11	15	0
34	Institute of Applied	**19**	6	0	0	0	2	7	7	3

No	Institutions	Permanent staff	Contract signed staff	Title		Degree				
				Prof	Ass. Prof	Dr Sci	PhD	MSc	BA	Others
	Physics and Scientific Instruments									
35	Centre for Training, Consultancy and Technology Transfer	**11**	4	0	0	0	0	6	5	0
36	TayNguyen Institute of Biology	**26**	10	0	1	0	9	10	6	1
37	Institute of Resources Geography HCM city	**32**	14	0	2	0	6	12	13	1
38	Institute of Physics HCM City	**35**	11	0	2	0	6	10	18	1
39	Tay Bac Institute for Scientific Research	**11**	4	0	0	0	1	2	7	1
40	Hue Institute of environment recourses and sustainable development	**14**	7	0	0	0	2	2	10	0
41	Southern Institute of Ecology	**8**	3	0	0	0	4	0	3	1
42	Institute of Genome Research	**14**	10	0	1	0	11	1	2	0
43	Center of informatics	**11**	3	1	1	2	2	0	6	1
44	Center for Assistance of Technological	**13**	7	0	0	0	2	2	8	1
45	Institute of Telecommunication Technology	**0**	0	0	0	0	0	0	0	0
46	Center for food technology and Technique Development	**0**	0	0	0	0	0	0	0	0
	TOTAL	**2.382**	**895**	**37**	**169**	**36**	**662**	**714**	**826**	**144**

10.2. Statistics on finance, scientific publications and education



Annual budget of VAST for the period 2008-2012

Statistics on projects and budget of VAST in 2012

No	Type of project	Number of project	Budget (Millions VND)
2	National priority programmes	19	21.009
3	National projects (Tay Nguyen III Program)	40	66.000
4	Application-oriented fundamental research projects	17	12.900
5	National protocol projects	31	37.290
6	National level test production projects	2	1.000
7	VAST appointed projects	22	7.250
8	VAST priority research projects	7	1.050
9	Key program of science and technology	87	18.660
10	Space science and technology program	13	11.870
11	VAST-ministry and VAST-locality cooperative projects	21	42.440
12	VAST international cooperation research projects	18	5.000
13	Missions of President	51	4.400
14	VAST level test production projects	12	3.050
15	Fundamental investigation projects*(including project 19, CT 47)*	10	2.950

16	VAST- MOST co-operative research projects *(including upgrade 03 international standard journals*)	9	2.000
17	Clean water, environment for rural areas program	6	3.000
18	Environment protection program	5	2.800
19	Eastern Vietnam Sea – Vietnamese Island program	12	2.600
20	Reciprocal of ODA projects	1	2.000
	Total	**386**	**314.241**
21	ODA projects	8	466.113
22	NGO projects	20	11.000

Statistics on publications and intellectual properties of VAST for the period 2006-2012

TT	Content	2006	2007	2008	2009	2010	2011	2012*
A	*Total published papers (1+2+3+4)*	**840**	**960**	**1047**	**1276**	**1575**	**1612**	**1698**
B	*Total international level papers (1+2+3)*	**292**	**259**	**297**	**453**	**509**	**550**	**601**
C	*Total SCI and SCI-E papers (1+2)*	**159**	**144**	**191**	**271**	**336**	**334**	**401**
1	SCI papers	96	92	166	202	247	209	258
2	SCI-Expanded papers	63	52	25	69	89	125	143
3	ISSN/ISBN papers	133	115	106	182	173	216	200
4	National journal papers	548	701	750	823	1066	1062	1097
5	Patents	9	7	2	2	9	7	6
6	Utility Solutions	2	4	1	1	1	4	5

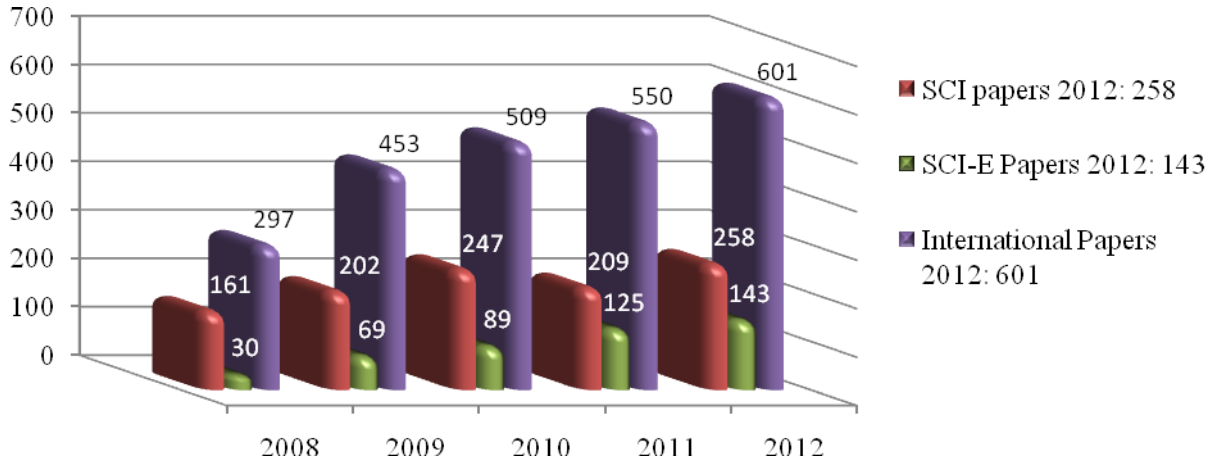
(*) up to 30/11/2012

Statistics on papers, books, patents and solution of VAST's institutes in 2012

No	Institute	International papers				National papers	Specialized books	Patents	Utility Solution
		Total	SCI	SCI-E	ISSN/ ISBN				

1	Institute of Mathematics	63	33	20	10	6			
2	Institute of Ecology and Bio. Resources	81	16	31	34	49	4		
3	Institute of Materials Science	52	36	9	7	117	2	1	
4	Institute of Physics	56	38	3	15	23		1	
5	Institute of Chemistry	39	22	14	3	155	3		
6	Institute of Marine Biochemistry	34	24	10	0	48	2		
7	Institute of Biotechnology	47	13	14	20	123	6	1	3
8	Institute of Geological Science	19	10	6	3	8	4		
9	Institute of Natural Products Chemistry	26	11	3	12	59	2		1
10	Institute of Environment Technology	15	9	2	4	54			
11	Institute of Mechanics	23	9	1	13	20	1		
12	Vietnam National Museum of Nature	15	2	7	6	3			
13	Institute of Information Technology	24	2	7	15	11			
14	Institute of Tropical Biology	10	4	5	1	60	2		
15	NhaTrang Institute of Technology Research and Application	11	5	2	4	18			
16	Institute of Tropical Technology	8	3	4	1	55	2		
17	Institute of Geophysics	12	3	3	6	50	3		
18	Institute of Chemical Technology	6	5	1	0	71		3	1
19	Institute of Genome Research	6	6	0	0	5			
20	Institute of Resources Geography HCM city	9	3	2	4	8	1		
21	Institute of Marine Environment and Resources	9	3	1	5	12	2		
22	Institute of Applied Materials Science	6	2	1	3	17			
23	Institute of Oceanography	6	1	2	3	44			
24	Institute of Physics HCM City	4	3	0	1	6			
25	Institute of Marine Geology and Geophysics	7	2	1	4	17	1		
26	Institute of Geography	6	2	0	4	44	7		
27	TayNguyen Institute of	6	0	2	4	15	4		

	Biology								
28	Southern Institute of Ecology	5	1	1	3	3	1		
29	Institute of Energy Science	2	0	0	2				
30	Institute of Applied Informatics and Mechanics	10	0	0	10	1	1		
31	Institute of Space Technology	3	0	0	3				
32	Institute of Applied Physics and Scientific Instruments	3	0	0	3	1	1		
33	Center for Assistance of Technological	0	0	0	0				
34	Publishing house for Science and Technology	0	0	0	0	15	15		
	Total:	**601**	**258**	**143**	**200**		**64**	**6**	**5**



Distribution of the published papers by VAST scientists in the period 2008-2012

Statistics on PhD and MSc education in 2012

No	Institution	Quantity	
		PhD	MSc
1	Institute of Mathematics	22	79
2	Institute of Information Technology	60	
3	Institute of Mechanics	13	7
4	Institute of Materials Science	31	
5	Institute of Physics	27	70
6	Institute of Chemistry	57	16

No	Institution	Quantity	
		PhD	MSc
7	Institute of Chemistry of Natural Product	18	
8	Institute of Biotechnology	39	
9	Institute of Ecology and Bio. Resources	24	95
10	Institute of Geography	29	
11	Institute of Geological Science	11	
12	Institute of Geophysics	3	
13	Institute of Applied Informatics and Mechanics	7	2
14	Institute of Chemical Technology	8	
15	Institute of Tropical Biology	7	
16	Institute of Oceanography	5	
17	Institute of Tropical Technology	22	
18	Institute of Environment Technology	9	
Total:		**392**	**269**

11. Orientations and plans for the year 2013

By the year of 2013, VAST will implement the scientific and technological plan under "the Master Plan to develop VAST to 2020, with a vision to 2030" approved by the Prime Minister, of which some particular targets and performance results demand for funding have been anticipated. With the budget given to the Academy at the beginning of this year, we will focus on the crucial tasks as follows:

11.1. Deploy Scientific and Technological tasks

11.1.1. Deploy tasks approved by the Prime Minister:

a) Deploy tasks in space technology strategy.

**** Satellite Project VNREDSat-1***: Complete contracts to launch satellites into orbit (expected in April / 2013); implement satellite test VNREDSat-1 on orbit; (at about 2 - 3 months after launch); transfer, and set up the whole satellite system into operation – completion of Package 1.

Infrastructure: Continue to complete other catagories like yard, garden outside building of 2ha in Hoa Lac area (from investment budget) – construction investment completion of branch in Hoa Lac; implement land compensation and construction of standard area for images in Phu Tho (provided land)

Fund for 2013 (Counterpart fund)

Development investment capital 14,500 million VND.

Budget (for operation and activities of ground bases) estimated 7,500 million VND of which cost of transmission line connecting the bases: 6,600 million VND; air tickets to Touluse (France) and attend launch ceremony: ~600millionl VND; costs propaganda, advertising, ...: 800 million VND; cost for electricity, water, oil, ... (current expenditure for operation of the groundstations): ~ 150 million VND; line transmission costs connecting to the satellite control station in northern Sweden, in the first six months after the satellite launch ~ 1,500 million VND.

*** Small Satellite Project VNREDSat-1B:** In the first six months of 2013: the completion of negotiations, contract package 1: design, manufacturing satellite VNREDSat-1B (62.6 million. Euro) and consultant packet (400 thousand Euro) with Belgium contractor.

Commencement of the satellite's ground construction at the Hoa Lac Hi-Tech Park (on the campus of the control satellite station VNREDSat-1). Counterpart funds in 2013 (development investment source): 10,500 million VND

***Vietnam Space Center Projects**: Completion of the detailed design of constructions for the Vietnam Space Center (implemented by JICA ODA); continue leveling package, clear land for construction: expected to be completed and handed over in Dec. 2013.

Counterpart funds in 2013 (fund from development investment source): 33,000 million VND..

b) Implement the project of the national specimen collection

Continue to implement the project components of the project "Set up a Collection of national specimens on Vietnamese nature" implementing in the period 2012-2015, expected cost is 97,300 million VND from three sources: science fund: 4300 million.VND; cultural fund: 73,000 million VND; and development Investment fund: 20,000 million VND as follows:

Vietnam National Museum of Nature Projects is provided fund in 2013:

Science: 4,300 million VND for the three project components: Set up and promulgate specimen standards and processes of specimen collection on organisms, geology and soil of the Vietnam National Museum of Nature (Specimens indoor, outdoor exhibits, research sample) (2012-2013). Total cost: 1,000 million, budget 2012: 400 million VND. Budget 2013: 600 million VND. Research overview of the potential to development the typical natural specimens of Vietnam (2012-2013). Total cost: 3450 million VND, budget 2012: 400 million VND; budget 2013: 3050 million VND.

Organize research on scientific and technical issues related to preserved specimens (2013-2014). Budget: 650 million VND.

Culture: 8710 million for the project's components, the "Creature evolution Division".

Development investment: 7,000 million VND to continue the implementation of the project's components "Capacity building on the collection, handling, processing, evaluation and preservation of specimens."

This is an important task for the early construction of Vietnam National Museum of Nature in Vietnam, matching a national museum system of Vietnam in 2013 and near future.

c) Project implementation "Strengthening the network of monitoring stations to serve the earthquake information and tsunami warning"

Improving capacity building in earthquake information and tsunami warnings, VAST has approved the project "Strengthening the network of monitoring stations to serve the earthquake information and tsunami warnings in Vietnam", 2009-2014, with cost estimated at 91 billion VND (Decision No. 1819/QD-KHCNVN 31/10/2008 by President VAST).

The project's purpose is to set up a system composed of 30 broadband seismic stations and earthquake data processing center capable fully recorded and quickly identified the parameters of the earthquake M ≥ 3, 5 Richter scale occurred on land and near seashore, the earthquakes M ≥ 6.5 Richter scale in the East Sea. The project was divided into two phases.

Phase 1 (2009-2011): Total budget used is 16 billion VND of which 2.5 billion VND for construction, 10.6 billion VND for equipment procurement, and 2.9 billion for others.

Phase 2 (2012-2015): VAST has decided to approve the second phase investment with a total estimated cost of 75 billion VND of which construction and procurement fund are 18.952 billion VND, and 50.218 billion respectively, 4.830 billion VND and 1 billion VND for contingency and following tasks:

Completion of the application for the land use to construct 21 new stations; 05 repaired stations: Sa Pa, Phu Lien, Da Lat, Son La and Bac Lieu; Procurement and installation of 23 new seismic equipment, 02 GPS and other equipment for the receiving and seismic data processing Center ;

Staff training for equipment use and operation;

Completion and using seismic observatory network in accordance with the approved project.

Fund was granted for the project is 16 billion VND in 2012. The project has implemented the work items as follows:

Biding preparation for buying broadband seismic equipments as follows:
- 05 broadband seismic machines , type 120 seconds;

- 18 broadband seismic machines, type 40 seconds;

- 12 broadband seismic machines, type 30 seconds.

The seismic machine will be received in 2013

Works for getting land and land compensation are carrying out for 23 stations, of which 5 stations have not yet paid for land compensation including Ha Giang stations, Tien Yen, Con Cuong, Hue and Con Dao.

11.1.2. The State scientific and technological tasks

a) Carry out tasks within the research program of the Central Highland 3 preparing the tasks for science and technology in 2013, Program Committee has reviewed the objectives, framework content to choose the proposals and submit to the VAST President for approval of the urgent task implemented from 2013. Program Committee has selected 18 scientific and technological tasks of individuals and organizations to be responsible for implementation in 2013 then submit to the VAST President for approval.

b) The strategy duties of the Space Technology and applied researches Space science and technology program will implement 17 scientific and technological researches in four directions in 2013:

Space technology applications: 6 projects;

Technology development and research: 6 projects;

Application-oriented basic research and technology development: 5 projects;

Push missile technology: 1 Project (have 5 subprojects).

Execution time from 2013 to 2015; fund for implementation in 2013 is expected to ~ 20,000 million VND.

c) The state tasks

Scientific and technological projects under the State program (KC)

Scientific and technological projects under the State Program (KC) implement for the new period 2011-2015. According to statistics based on reports sent by Institutes, up to now, VAST is assigned to 21 scientific and technological projects with a total cost of 78,330 million VND from KC.01to KC.10 Program. The 21 subjects in which six projects completed in the end of year 2012, 15 projects to continue in 2013. Total fund for implement is up to 42 440 million VND in 2012.

The projects, state independent projects

VAST is assigned the 19 state independent projects with a total budget of 67 550 million VND. Of which 13 subjects continue to the next year. The projects are evenly distributed in large research institutions, and in particular, Institute of Geology has 5 projects. The Projects are distributed in the field of geology, biology, chemistry, geography, materials science solve urgent problems, big problems in practice.

"Research on the effects of tectonic seismic to stability of hydropower dam Song Tranh 2, North Tra My, Quang Nam province" began in 2013, the total budget approved for project 10,500 million VND.

The projects of state co-operation protocols

VAST had done 21 co-operation tasks, projects in 2013, including 6 projects (2011-2013) and 15 new projects (2012-2013, 2012-2014). The tasks and projects co-operated with the following countries: 4 projects from French Republic, 3 projects from India, the two projects from the United States, 2 projects from Japan, two projects from Germany, the two projects from South Korea, 2 projects from Laos, 2

projects from Thailand and the remaining two projects from other countries of Russia and Taiwan.

11.1.3. Scientific and Technological tasks/projects of VAST

a) Independence project, the tasks assigned by the President of VAST Independent projects and the tasks assigned by the President of VAST: The project / tasks to continue in 2013: 10 projects / tasks with a budget of 1,400 million VND. The new projects have a budget of 4.000 million VND. The total budget is 5,400 million VND in 2013.

b) Scientific and Technological Projects of the seven key sectors of VAST According to the development plan of VAST approved by the Prime Minister, VAST identified seven key sectors on science and technology. VAST has identified 47 new projects and 45contiued projects with a total budget are 22,590 million VND in 2013. Seven key sectors of science and technology as follows:

•Information technology, Automation, Electronics and Space Technology
• Biotechnology
• Materials Science
• Biodiversity and bioactive substances
• Earth Sciences
• Maritime Science and Technology
• Environment and Energy

11.1.4. Authorized tasks approved by VAST

* The Island – Sea Program

Propose two new projects under the Island – Sea Program with a total estimated cost of 5,000 million VND in 2013.

* National Environmental Program on clean water and rural sanitation

VAST continues to implement and complete the 4 project from 2012 and open two new projects with a total budget of 1870 million VND.

The environment

VAST continues to implement 5 projects on environmental protection with the total cost is 2,600 million VND in 2013.

Due to lacking of fund, the environmental tasks only focus on the continuing and finishing tasks, having a lot of difficulties in the progress implementation shown in the approved proposal. The tasks were extended for several years therefore the results of the task is not efficient. These tasks have been approved by MONRE in 2009; 2010 Circular No. 114/2006/TTLT-BTC-BTNMT December 29, 2006 (Prior to Circular 45/2010/TTLT-BTC-BTNMT dated 03.30.2010 was issued).

* Basic Projects

Budget for 03 new projects is 1,600 million VND and 04 continuing projects is 1900 million VND. Basic survey task for station system is 300 million VND in 2013. Total cost is 3,800 million VND.

11.1.5. Implementation of young staff program of VAST and other supports The Program supporting young scientists was prepared in 2011 and implemented in 2012. The Program is applied to the young scientists who are permanent staffs of the VAST and outstanding scientists wishing to become staff of VAST. VAST continues to implement the contents showed in the program in 2013 as follows:

- Support for scientific and technological activities for young scientists: basic research support for more than 280 permanent staffs of the VAST; provide fund for 7 continuing projects and 13 young independent projects of VAST, with a total cost of nearly 6 billion VND.

- Implement programs to attract outstanding scientists working in VAST.
- Promote the procedures related to dormitory construction projects for young scientists approved in the near future.

11.2. Undertaking the tasks of investing and building scientific and technological resources

11.2.1. Orientation of capical construction investment and planning

The developing investment capital in 2013 is 205 billion VND implementing 11 projects, of which 3 projects finished in 2012 will be handed over at the beginning of 2013, Counterpart fund for 3 ODA projects, 4 transitional projects (Earthquake observatory network for earthquake news, tsunami warning and expanding project of Institute of Marine Environment Resources and Oceanographic Museum at Do Son, training and service area; specimens of Vietnam natural Museum); starting carrying out 3 projects: Office of Institute of space technology and Marine Biology and Chemistry (at Nghia Do), implementing research facility of Institute of Applied Material Science (at Thach Loc, Ho Chi Minh city), pilot project: Investment in the development of modernization of Geological Institute (Chua Lang Street, Hanoi)

11.2.2. Orientation of repairing and small construction plan

The work of repairing workplace and small construction: In 2013, estimated cost of - over 30 billion in which: disbursement for the project finished and handed over in 2012 was 6.3 billion, over 10 billion focused on the tasks of VAST ‘s infrastructure such as relocation of Animal Museum (in front of the central building) and Nghia Do clearance area (stage 3) in accordance with the approved plan….in order to quickly bring new projects into operation in early 2013; the remaining fund was allocated for overcoming the consequence of storm No 8 and repairing anti-degradation for subordinate units.

11.2.3. Orientation plan of enhancing the equipment

In 2013, VAST continues to give the fund for for implementation of plans to improve the potential research equipments for subordinate units with 4 transitional-ended projects, 1 transitional and not ended project (project to enhance facilities for Mechanical Engineering – Electronics store), about 5 new-opened projects and more than 3 billion VND for the small equipment projects and supporting big shared equipment. The projects have been evaluated, approved and will be implemented soon to ensure the progress.

11.3. Regular works: Personnel and training, financial plan management, information - publishing, international cooperation

a) Personnel and training

Continue implementation of the Law on Cadres and Civil Servants and other guiding documents.

Continue implementation of Law on Officials and other guiding documents.

Closely coordinate with other related agencies to manage business according to law. Collaborate with the Planning and Finance Board, Application and technology development board, Board of arranging and renovating business to continue arranging and transforming state business according to law

Continue arranging, settle down eventually Units 35 according to the regulation of the State and VAST

Complete and submit to the President of the Institute to approve the project to strengthen the organization and operation of the research units.

Well implement planning, appointment, reappointment, transferring, resignation, dismissal position of leaders at all levels according to regulation

Perform the regimes, policies on personnel according to regulation including: recruitment, training, training, re-training, examination of increase level, salary policy, social insurance, pension, emulation and rewarding, etc

Enhance the training of political theory and state management for staff working as leaders and managers according to the leadership standards, appoint qualified staff to attend training courses on management state knowledge

Organize training class of technical and economic knowledge for officials and employees

Well perform the task of sending officials to study and to work abroad according to regulation

Continue to well implement Decree No. 37/2007/ND-CP dated on March 9th, 2007 of the Government on the transparency of assets and income

Inspection, instruction: Enhance inspection, instruction, using the subordinate units in the implementation of the organization and the staff

Guarantee the protection to internal politics, maintain political stability at VAST.

Implement new Decree of the Government defining the functions and tasks of the VAST replacing Decree 62/2008/ NĐ-CP

b, Financial- planning management

Implement the plan for allocating current expenditure of VAST, allocated fund was determined base on the quantity and quality of staffs, scientific and technological products, considering factors such as unit size, geographical location, etc. consistent with the actual situation and the variability of the units, in accordance with the development plan of the Institute

Well implement the program for young officers; promote to build campus for young officials. Implement the plan in accordance with total plan of VAST until 2020, vision of 2030 was approved

Strengthen the supervision and monitoring of implementing estimated budget, implementing of themes, science and technology projects at all levels, economical and efficient use of equipment and work area of each units in the Institute; accelerate the progress of completing the settlement reports of units.

c. Information, publishing activities

Continue to implement the project "Purchase of foreign science and technology magazine period 2011-2015" online by the general trend of the world's libraries. Evaluation of the effectiveness of digital libraries to implement the second stage of this task

Three schemes to improve the quality of magazines meeting international standard still continue to implement the approved plan to achieve goals: after 4-5 years, 1-3 of the Institute's magazines are listed in the SCI or SCI-E of ISI. Early accept 1st stage of the Scheme to improve the quality of the Advances in Natural Sciences journal and prepare the 2nd stage of the project evaluation

Increase the investment and improve the quality of science and technology Journals and other specialized fields (9 Journals). Update database of the magazine on the publisher's website, gradually forming the online magazine to advertise the specialized Journal of the Institute. Estimate 2 to 3 of 9 science and technology magazine from VAST magazine that will build the outline into the scheme to upgrade the international quality

Application of Online submission software is on operating in the Journals. From 01/01/2013, all 12 magazines use Online Submission software on Journal management online

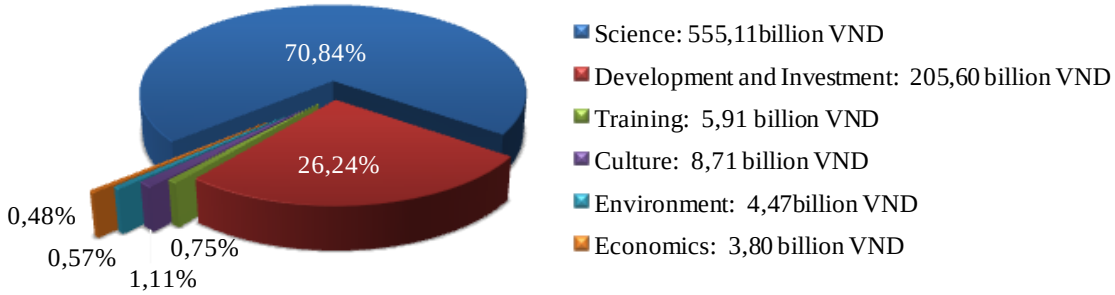
Continue to publish science and technology monograph books according to approved scheme framework. Implement 2nd stage of publishing monograph book Vietnam Sea (ordered by the State)

Maintain the operation of electronic information of VAST towards increasingly better, improve the quality of information and visits.

Continue to perform the tasks assigned by the Institute's President: constructing the Project development and application of IT in VAST period 2013 - 2018 and orientation to 2025

Continue to offer new e-mail accounts for all officials and employees of the units to serve scientific research

11.4. State budget Estimate in 2013



The rate of allocating VAST's funds in 2013

Based on the Decision No. 1792/QD-TTg on 30/11/2012 of the Prime Minister on the allocation of the State budget Estimate in 2013, Decision 3062/QD-BTC on 03/12/2012 of the Minister of Ministry of Finance on giving State budget estimate in 2013 is 784.000 million VND, in which included 205,6 billion VND on development investment, 578,4 billion VND on current expenditure, in details: 555,11 billion VND on science, 5,91 billion VND on education, 3,8 billion VND on economics, 4,47 billion on environment and 8,71 billion on culture. The Institute worked with all subordinate units about funding needs and giving target plans of 2013 to each unit on January 2013