

#### **EDITORIAL**

## **Reaching Out**



S cience used to exist in the realm of the learned. And scientists used to dwell in ivory towers. These were apt descriptions of what science used to be. Yes, it used to be like that.

In this day and age where information is shared instantaneously, there remains, however, the question "Is everyone really empowered?" Some

may even ask "What about inclusiveness?" Yes, empowerment and inclusiveness are words too big to swallow, even for those with the most voracious of appetites.

It is noteworthy that despite the actual and perceived limitations, the Department of Science and Technology (DOST) has never ceased to deliver wonders by reaching out to people regardless of economic status, sexual orientation, political belief, religious affiliation, and what not.

In the 2016 celebration of the National Science and Technology Week or NSTW, the biggest annual event in the science community organized by the department, a totally different approach was employed. For the first time, the one-time-big-time national celebration with events in four regional clusters was changed into real national simultaneous celebrations; where events were held in all DOST regional offices aside from the four major science hubs in Bicutan, Taguig City; Quezon City; Manila; and Los Baños, Laguna. The theme was Juan Science, One Nation.

With this major change, the new DOST Secretary Fortunato T. de la Peña has this to say, "We hope to sustain the enthusiasm on science and technology created by the past administrations and work on what remains to be resolved for the benefit of even those who are on the outskirts of development. This is the first time that the DOST will be

doing a simultaneous celebration not only in Manila, but to the different regions of the country."

For any event organizer, complicated setup like these simultaneous events all over the country is a logistical nightmare. But for those who pursue noble causes, trying to at least realize a bit of the words "empowerment" and "inclusiveness", everything is possible. The extent of the initiative may almost be immeasurable but for the tireless people in the entire system, nothing is impossible. It was reported that about 140,000 souls were reached by the 2016 NSTW – almost double from the 2015 figure.

Perhaps, we can only agree with Aniekee Tochukwu Ezekie, author of Friendship for Leadership', when he said "When passion meets work, work becomes a hobby." This is especially true to the hardworking people of the Department who tried every possible means to reach out. In realizing the challenge, it is as if they have been accustomed to their usual loads, making their everyday work part of their everyday routines, thereby making work a habit of sort.

The science chief led the annual NSTW activities at the DOST Complex in Bicutan, Taguig City as the celebration kicked off on the 25th of July. The event was De la Peña's first major S&T activity upon his assumption to office.

The 2016 NSTW featured technology open houses, symposia, scientific forums, technology fairs, film showings, scientific career talks, and technology launches among others. In the provinces, the DOST regional offices prepared various exciting activities. The NSTW is celebrated every third week of July of each year through the Proclamation No. 169 of 1993. It aims to recognize the contribution of science and technology in the development of the country and garner support from the public and private institutions for its sustainable development.

#### Aristotle P. Carandang, PhD



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#### **OUR COVER**



The cover shows how the next generation is connected to the future through science and technology. This is why we lay down the ground works with great care and foresight. Juan Science is essentially for Filipinos, by Filipinos, from now to the next generations. (Cover concept and design by Kimverlyn C. Sayson; Photography by Henry A. de Leon)

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#### ERRATUM

#### S&T Post April-June 2016 Issue

The photo caption on page 5 titled, DOST's Hybrid Electric Train, last sentence, should have been. It can accommodate 220 passengers per coach, or a total of 880 people for every train set that has a total length of 60 meters.

On page 15, the first sentence in paragraph 8 should be as follows: As an academic, de la Peña had presented papers in local and international conferences in the areas of e-governance,..., and the United Nations Educational, Scientific and Cultural Organization.



#### Science that binds us as a people

By Richard P. Burgos Director, STII

f we were awed at the impressive displays and program features during the recent National Science and Technology Week and its regional versions, then it is not a surprise that we will do our craft even better as science and technology workers. Viewing the awesomeness of our collective work simply breathes inspiration to our souls.

A study published in the Journal of Personality and Social Psychology suggests that awe can make people less absorbed by themselves and become more responsive to the needs of a larger group. This may be the reason why a celebration showcasing the work of the science community such as the NSTW stimulates us to improve our work even more.

The NSTW highlights the positive impact that science, technology and innovation have on our country's economy and on our pride as a people. We have indeed made a huge leap forward in terms of capability, thanks to DOST's greatly enhanced S&T human resource development program. Thus, aside from impressive basic science researches at the atomic and nano level to practical and highly useful technologies and services, we aimed even higher and now we have Diwata-1 in space. This is Juan Science at its best.

This is the Juan Science that this issue of the S&T Post wants to highlight. This issue gives us the opportunity to go community- and region-hopping in regard to the NSTW and RSTW celebration nationwide.

That the NSTW was successfully celebrated nationwide in a simultaneous manner is proof that we have already built a fairly strong community capacity for conducting S&T activities. The boost in the overall number of participants shows that S&T activities have burgeoning followers. This is more than enough reason for us to continue and boost up our yearly NSTW. In participation, the NSTW also encourages the youth to realize the value of science and consider career options in science and technology. The amazing display of works of experts, researchers, and scientists indeed fires up the soul to tread on the paths of the noble, though at times unrecognized, people.

Yet the NSTW is not only a venue for eyeing S&T displays and science careers. It is also a showcase of opportunities to technology developers, entrepreneurs, and even investors. At the end of the line, this helps push forward the country's economy.

The NSTW makes us all a part of a grand thing. The awesome feeling turns our attention away from our own needs to that of the greater good.

Clearly, the NSTW as a portal of Filipino S&T has bound us as a people, as one nation. It brought out the best in all of us in our respective areas of work. Isn't that awesome?



FROM THE PUBLICATION DIRECTOI

### Towards a greener environment: ITDI develops abaca composites for Tryk ni Juan

**BY VIOLY B. CONOZA,** DOST-ITDI (WITH REPORTS FROM C EMOLAGA & DELIA DELICA GOTIS)



Taguig City Mayor Hon. Lani Cayetano and DOST Secretary Fortunato T. de la Peña ride on DOST-ITDI's Tryk ni Juan with its abaca-made roofing and sidecar.

**TRYK NI** Juan is the latest venture of the DOST-ITDI (Industrial Technology Development Institute) in promoting the use of green composite materials from locally abundant natural fibers like abaca for automotive applications to help make a greener environment.

Focusing on the green attributes of abaca fiber, materials science experts from ITDI developed the abaca fiber-reinforced composite to fabricate the roof and sidecar of the common tricycle.

Experts combined abaca fibers and resin to form the composites as materials to the roof and sidecar which are now branded as Tryk ni Juan.

"The project which started in 2010 is a collaborative research between the ITDI and Korea Institute of Materials Science (KIMS) – Association of Southeast Asian Nations that aims to increase cooperation between the parties in the field of materials science and develop abaca fiber-reinforced composites for industrial application," said Dr. Marissa Paglicawan, project leader, supervising science research specialist of ITDI's Materials Science Division.

The ITDI-developed composite material is a good substitute material for metals like stainless steel, galvanized iron, and other materials commonly used to make tricycle roofs and sidecars, and some automotive parts/components.

The ITDI and KIMS researchers explored the use of different abaca treatments, surface modification techniques, and composite production technologies (e.g., vacuum-assisted resin transfer molding) for natural fiber reinforced-composite production.

In June 2015, the ITDI, Gnostek Inc., and the General Santos Street Lower/Upper Bicutan Taguig Tricycle Operators-Drivers Association, Inc. (GSS-LUBTTODAI) signed a memorandum of agreement assigning Gnostek Inc. as fabricator of the abaca fiberreinforced composite for tricycle driver's roofs; and GSS-LUBTTODA members as recipients/participants in the performance/ field-tests. As agreed upon by the parties, 15 prototypes were fabricated and installed on participating tricycle units and deployed for actual road test/use this year.

The collaborative project capitalizes on the abundance of locally available natural fibers like abaca in addressing the need for new reinforcing materials that are both cheap and environment friendly. Abaca fiber (known as Manila hemp) is endemic in the Philippines and is considered one of the strongest natural fibers. It is also far more resistant to salt water decomposition than most vegetable fibers.

Over the last few years, the negative impacts of climate change had been increasingly felt so that environmental awareness among our people had also been steadily mounting. These also led to the development of new alternative materials among which are natural fiber-reinforced composite materials.

Paglicawan further explained, "Composite materials are made from two or more constituent materials with significantly different physical or chemical properties that, when combined, produce a material with characteristics different from the individual components but acting in harmony suitable for structural applications. Now we used the abaca fiber as reinforcement material to promote the philosophy of green composites and increase the share of natural fiber composites in automobiles as well as structural parts in other industries."



Master mold preparation

Prototype products

Because fibers are stronger and stiffer, fiber reinforcement was shown to be very effective. And currently, more industries are investing on environment friendly, sustainable materials such as natural fiber reinforced composite materials such that these are now considered an important class of materials. The properties of the composite can also be tailor made, depending on the specific purpose, making it even more desirable.

Abaca is a locally abundant natural fiber. It is a lightweight, renewable, sustainable raw material. The Philippines is the world's leading abaca producer, producing around 50,000–57,000 tons per annum. It is mainly used for industrial cordage, handicrafts, fashion products such as hats and accessories, home and houseware and decorative products.

In recent years, abaca has shown promise as an energy-saving replacement for glass fibers in automobiles. For one, Mercedes Benz is known to have used abaca fiber - reinforced polypropylene composites in automobile body parts while Daimler Chrysler used them in under floor protection of passenger cars.

Literature also says that in 2011, Girones et al., claimed that "the use of abaca fiber instead of glass fiber reduces the weight of automotive parts, bringing about 60% savings in energy and reduces CO2 emissions." These green attributes thus help build a healthy ecosystem while reducing production costs.

While adding value to abaca, this innovation also provides opportunities to explore and maximize the use of other locally abundant natural fibers for composite fabrication that may yet revitalize the local natural fiber industry.

Increased demand for abaca fiber composites can also provide employment opportunities and improve the income of abaca fiber producers. This may also lead to further exploring and maximizing the many other uses or applications of abaca and other local natural fibers.

For inquiries, please contact Dr. Blessie A. Basilia, Chief, Materials Science Division; Tel. (632) 837.2071 to 82 local 2201 or email: msd@itdi.dost.gov.ph.

# **DOST**-supported entrepreneurs to reach more clients through new publications

BY FRAMELIA V. ANONAS, DOST-STII



LOCAL ENTREPRENEURS now have more channels to help them further reach potential clients. With the launch of the Department of Science and Technology – Technology Application and Promotion Institute's two publications, entrepreneurs who availed of DOST support now have more market opportunities.

"I hope everyone here is as excited as I am to marvel at the collection of DOST-assisted innovations in 'Kalipunan: Compendium of DOST Technologies', (and) to be inspired by stories of entrepreneurial success in the 'Compendium of Successful TAPI-Assisted Projects Under Venture Financing Program," said DOST Secretary Fortunato T. de la Peña in a speech delivered by Undersecretary Rowena Cristina Guevara during the launch.

According to TAPI Director Edgar I. Garcia, "The launch of the publications and website will hopefully inspire our clients and encourage to forge new collaborations with our stakeholders." The "Kalipunan: Compendium on DOST Technologies," according to Dir. Garcia, serves as reference material on DOSTassisted technologies and promotes said technologies to the public. The book contains technology descriptions, contact details of researchers, identified beneficiaries or adoptors, pictures, and other information from DOST research institutes and councils.

Meanwhile, the Compendium of Successful Venture-Assisted Projects gives brief stories on 37 DOST-TAPI-assisted entrepreneurs that hurdled their early challenges and struggles, particularly in securing critical working capital and equipment in running their businesses.

Currently, DOST-TAPI has seven priority areas of assistance, namely food processing; furniture; gifts, housewares and decors; marine and aquaculture; horticulture and aquaculture; metals and engineering; health products and pharmaceuticals; and ICT and electronics. (Photo by Henry A. de Leon, DOST-STII)

## **DOST's transplanter and harvester**

BY JOY M. LAZCANO, DOST-STII

#### THE DOST-DEVELOPED

transplanter and harvester indeed made faming more efficient.

The transplanter can sow seedlings in two hectares per day, doubling the efforts of 20 farmers who can do the task n just a hectare a day. DOST's prototype transplanter can be used with the common type of hand-tractor though other designs are being developed.

The transplanter's initial testing in Regions 3 and 4-A showed an 80 percent efficiency rate, which means that it meets the requirements of the Philippine Agricultural Engineering Standards.

Meanwhile, the combine harvester can reap grain crops on a two-hectare ricefield in four days. Field trials show that the harvester works as efficiently as its commercial counterparts but at lesser cost. Moreover, it can also do other functions such as threshing and sacking.

The harvester and transplanter cost around P150,000 and P100,000 respectively while those in the market now cost around P200,000 to P250,000 for a transplanter and P270,000 to P350,000 for the harvester.

These two innovative farming equipment were developed by the DOST-Metals Industry Research and Development Center were on display during the 2016 NSTW. The DOST combine harvester, a practical agricultural equipment that combines the function of a reaper, thresher, and sacking of grain crops.

The transplanter serves as a mechanical attachment to a common hand-tractor allowing for one-day planting of rice stalks for a two-hectare land, normally done by 20 farmers in a day.

S&T POST

# Big push for locally developed innovative products

By ALLAN MAURO V. MARFAL, DOST-STII



Developers of JOLT, a power hub with dual-mode chargers and solar panels that can be integrated into a home energy storage, communications and security system, answer the inquiry of one of the attendees of Leaders in Innovation Fellowship Demo Day last August 05 at Asian Institute of Management Conference Room in Makati City. (Photo from AIM Facebook Page)



Dr. Rowena Cristina L. Guevarra, undersecretary of the Department of Science and Technology (DOST) for Research and Development, during the event. Dr. Guevara was proud to say that there are many Filipinos who are naturally innovative and creative, and the government and private sectors just have to empower them. (Photo from AIM Facebook Page)

HOMEGROWN INNOVATORS recently presented innovative products to prospective investors even as the Department of Science and Technology gave the biggest push for this convergence.

Said convergence, dubbed "Leaders in Innovation Fellowship (LIF) Demo Day", was held recently at the Asian Institute of Management (AIM) in Makati City by the Royal Academy of Engineering and AIM, with support from DOST.

The LIF featured 15 selected technology products and their innovators who presented their ideas for possible business investors and customers. Among the products presented on Demo Day were DOST's Food Innovation Center, AgMULA RTA Rice Transplanter Attachment for Hand Tractors, Jolt: A Home Energy System, Smart System, Relief Vent, Pinpoint, Heart Smart, Visser, and Guaviderm.

The innovators underwent courses for 10 months at AIM and in the United Kingdom to hone their entrepreneurial skillset.

DOST Undersecretary Rowena L. Guevara said that the Science Department has spearheaded programs which encouraged and empowered Filipinos in terms of conducting researches and product development which could offer appropriate and timely solutions to the country's pressing problems.

She asked the public and stakeholders to look closely at these innovative products and assess how these could help in improving their respective products and services.

Guevara stated that the agency spends P3 to 5 billion every year to fuel research and development (R&D). The last two years, she said, made them realize that the technologies they are working on are readily available for technology transfer, inspiring them to spend more on it.

"We go as far as formulating guidelines we call 'Fairness Opinion Report' which is necessary for any government-funded R &D so they can transfer it to their private partners. We realize that we cannot do it alone; we need partners like Royal Academy of Engineering and AIM to make these things happen," she said.

In her remarks, Guevara was proud to announce that the ranking of the Philippines, when it comes to innovation, has climbed to number 48 from 111 in 2009. Meanwhile, DOST-Philippine Council for Industry, Energy and Emerging Technology Research and Development Executive Director Carlos Primo David agreed with Usec. Guevara about "DOST's ultimate goal of making S&T work for the country." He said that the DOST's goal is to reach beneficiaries and contribute to the nation's economy through the growth of technology-based processing.

He added that since last year, the DOST has developed a system called 6Ps which stands for products, patterns process, publications, people and powering.

David also expressed satisfaction over DOST researchers' transformation in terms of teaching skills. He asked for the continued support of DOST's partners, such as the Royal Academy of Engineering, AIM, and business sectors; and congratulated their project leaders for a job well done.

Moreover, he believes that technology in the Philippines is doing great. "Sa siyensya, may pag-asa (There is hope in science). We are shaping future leaders of Asia," he ended.



# **Brighter health care with solar power**

BY BERNARDO T. CARINGAL, ELEAZAR P. MANAOG, and ATHENA COLLINE L. VERDEY DOST-MIMAROPA

**SOLAR POWER** is brightening up health care delivery in MIMAROPA.

After some 750-watt solar home systems (SHS) were put in place in rural health facilities in barangays Bantay and Maniwaya in Boac and Sta. Cruz respectively, health workers and concerned local government officials are now more confident that their health care services will go the extra mile.

The solar home systems were installed through the collaboration of the Departments of Science and Health in MIMAROPA, in partnership with the local government of Marinduque. After the systems' installation, the rural health facilities now have power for lighting, ventilation, and cold storage of vaccines. The power also enables the facilities to be operational on a 24-hour basis.

The basic system consists of solar panel, charge controller, battery and inverter installed in a way that could get the maximum energy from sunlight.

Now with a reliable power supply, the health facilities can also already fully use the RxBox for checkups to safeguard patients' health, especially those of expectant mothers. Like most medical devices, the RxBox runs on electricity. However, this telehealth technology was not fully maximized because of the struggle to connect to the grid and maintain a reliable power supply.

In another development, the local government units of Gasan and Boac proposed for the rollout of solar home system technology in three of the most isolated areas in Marinduque-- barangays Pinggan (Gasan), Tumagabok, and Binunga (Boac). A birthing facility in Brgy Binunga will also soon have a solar home system to address the dire need for consistent power supply. This paves way to an improved and sustainable health care access even to the farthest communities in the province.

The establishment of solar home systems is the result of the advocacy of DOST-Mimaropa Regional Director Ma. Josefina P. Abilay to provide meaningful health care improvement in rural communities across the region through innovative solutions. The regional office's persistent lobbying efforts convinced the Department of Health-(DOH-Mimaropa) and local government units in Marinduque to move first in electrification of health facilities in Marinduque using the solar home system.



Provincial S&T - Marinduque Director Bernardo T. Caringal and Renato Jogno orient and demonstrate to Dr. Rowena Grace Garcia the newly installed Solar Home System in RHU-Bantay.



A 750-watt Solar Home System set-up inside RHU-Bantay with 5 (6sm) batteries, sine wave inverter, and solar controllers

#### Solar energy: Your go-to power source during disasters

Extreme-weather related disasters affecting the Philippines usually result in power loss and damage to communication lines, aside from the horrific loss of lives and properties. Many people too are forced to live in evacuation centers to stay safe.

Mogpog Mayor Senen Livelo, recognizing the need for constant energy supply in critical facilities like evacuation centers, called on DOST-Mimaropa through the Provincial Science and Technology Center in Marinduque (PSTC-Marinduque) as partner of LGU-Mogpog. Together, they installed a disaster-ready solar home system technology for lighting, ventilation, and charging communication gadgets and other devices in 18 barangay halls in Mogpog namely: Dulong Bayan, Gitnang Bayan, Sumangga, Banto, Lamesa, Malayak, Paye, Hinadharan, Sayao, Guisan, Balanacan, Villa Mendez, Laon, Capayang, Argao, Market Site, Bocboc, and Silangan. These solar-powered barangay halls will serve as well-equipped shelters that can accommodate people when natural disaster strikes.

Apart from the barangay halls, the solar home system will soon be available in six national high schools across Mogpog as well as in schools located in two of the most geographically isolated areas in Marinduque: barangays Pinggan in Gaspar Island, Gasan and Tumagabok in Boac. The solar home system will enable at least three classrooms to serve as alternative evacuation centers with uninterrupted power supply in critical times or during emergency.



Porfirio M. Alino

Antonio Miguel L. Dans



Arsenio Balisacan



Arvin C. Diesmos



Allan B. Bernardo



Mary Ann Lansang



Lourdes J. Cruz



Rodel D. Lasco





Jurgene H. Primavera

# DOST National Scientists & Academicians among top ranking PH scientists

**MEMBERS AND** awardees of the Department of Science and Technology's National Academy of Science and Technology made it to the list of top ranking scientists in Philippine Institutions, based on Google Scholar Citations public profiles as reported by Webometrics, the largest academic ranking of higher education institutions.

Among the top 453 profiles listed in the third edition of the ranking, National Scientist (NS) Lourdes J. Cruz and Academician (Acd.) Jurgenne H. Primavera ranked second and third, respectively.

Meanwhile, academicians who made it to the top 20 include Acd. Antonio L. Dans (rank 7), Acd. Rodel D. Lasco (rank 13), Acd. Arsenio M. Balisacan (rank 14), Acd. Gisela P. Concepcion (rank 16), Acd. Allan B. Bernardo (rank 18), and Fernando P. Siringan (rank 19).

Outstanding Young Scientist awardees also secured spots in the list namely, Arnel Salvador (rank 4), Raymond Tan (rank 5), Arvin C. Diesmos (rank 9), Porfirio Alino (rank 12), Ernesto Pernia (rank 15), and Mary Ann Lansang (rank 17). NS Gavino C. Trono Jr. landed on the 20th spot

Cybermetrics Lab collected the data in the second week of June 2016 from the public

profiles of researchers working in Philippine institutions, based on the Google Scholar Citations database.

Webometrics publishes a unique ranking of universities in every edition – a result of a careful investigation of a

combination of indicators. Its data is generated by Cybermetrics Lab which has been developing quantitative studies on the academic web since the mid '90s.

The ranking aims to promote academic web presence by supporting Open Access initiatives, electronic access to scientific publications, and other academic materials. It also uses web indicators as proxies in the correct, comprehensive, deep evaluation of the university global performance, taking into account its activities, outputs, and their relevance and impact.

Google Scholar (GS) is a free bibliographic database while Google Scholar Citations is a tool for setting up author profiles of individuals and their publications as covered by GS.



Fernando P. Siringan



**Gavino C. Trono** 



Arnel A. Salvador



Raymond R. Tan



**Ernesto Pernia** 



# Diwata-1 sends more hi-res images

**ONLY DOES** Diwata-1 blaze the heavens; it also blazes the trail for image capturing, not just for the Philippines but for the whole world.

A month after it was launched into space, Diwata-1, the Philippines' first microsatellite, successfully captured images with a ground resolution of about three meters through its High Precision Telescope (HPT) – an achievement dubbed by Hokkaido University as a "world-best for a 50 kg-class microsatellite."

This was announced recently by the Department of Science and Technology's Advanced Science and Technology Institute and the University of the Philippines Diliman. The latter partners with Hokkaido and Tohoku University in Japan for the microsatellite's operation.

Last May 19, Diwata-1 captured a red, green, and blue image of Mindanao at a ground resolution of about three meters. This





Figure 1. Comparison of two RGB color images: (a) Diwata-1's High Precision Telescope (HPT), (b) Landsat 8's Operational Land Imager (OLI). The images captured a mountainous area in Mindanao, Philippines at 9:07 Phil. Standard Time on 19 May 2016 by HPT and 10:06 Phil. Standard Time on 21 May 2016 by OLI. The Diwata-1 HPT image can clearly identify trees, rock surface, mountain paths, river and some man-made objects groundbreaking development is a remarkable improvement over another photograph of Mindanao by the American earth observation satellite Landsat 8's Operational Land Imager (OLI). The image was captured at a ground resolution of 30 meters. Landsat 8 has a launch mass of about 2,600 kg compared with Diwata-1's 50 kg.

Later on June 30, during observation of a suburban location in Florida, an advanced technique was used to control the satellite's altitude and direct the camera at a particular place. This advanced technique is called target pointing. To show vegetation in that particular place, near-infrared-band data was used to create the image.

Below is a comparison of the images taken by Diwata-1's HPT and Landsat 8's OLI.

The photo on Figure 1a shows the RGB composite (normal color) images taken by Diwata-1's HPT at 9:07am Philippine Standard Time (PhST) on 19 May 2016 and the photo on Figure 1b shows Landsat 8's OLI at 10:06 on 21 May 2016 in PhST. The images show portions of Dumingag, Zamboanga, a mountainous area in Mindanao. The OLI image with a 30-m ground resolution can identify only rough structures of the mountain but the detailed geographical features are unclear.

On the other hand, the Diwata-1's HPT image can clearly identify trees, rock surface, mountain paths, river and some man-made objects (Figure 1a). With a clearer photo from Diwata-1's HPT camera, it will be easier to see which areas are affected by natural and even man-made disasters such as floods and fires. It may be recalled that one of the objectives of Diwata I is to determine the extent of damages from natural hazards such as typhoon.

Meanwhile, the next photos show a comparison of "false color" images of an urban area in Florida, United States, which were taken by Diwata-1's HPT at 7:48am Eastern Daylight Time (EDT) on 30 June 2016 and by Landsat 8's OLI, respectively. "False color" images are created to emphasize the difference between vegetation and other objects using three different bands. The photo on the left (Figure 2a) is an image constructed by stitching six successive images captured by Diwata-1's HPT camera with one-second intervals.

As a successful demonstration of the target pointing capability of Diwata-1, the microsatellite was able to capture six images of the focused area with field-of-view of 2 km x 1.5 km even though it was orbiting the Earth with a velocity of ~7.7 km/s at an altitude of ~400 km. It





Figure 2. Comparison of two false color images: (a) Diwata-1's HPT, (b) Landsat 8's OLI. The images captured an urban area of Florida, United States at 7:48 Eastern Daylight Time (EDT) on 30 June 2016 by HPT and 11:55 EDT on 9 July 2016 by OLI. Figure 2a is created by stitching six successive images captured by Diwata-1 through its target pointing capability. The red-colored area indicates vegetation. The buildings and roads can be clearly distinguished from the vegetation in the Diwata-1 HPT image.

can be seen that buildings and roads are clearly distinguishable from the vegetation in the HPT images (Figure 2a), while such features are very unclear in the OLI image (Figure 2b).

The ability of Diwata-1's HPT camera to take pictures of places even outside the country is a good indication that through Diwata-1, the Philippines will be able to share and exchange images among a group or constellation of microsatellites with neighboring countries for mutual benefit. This is one of the objectives of the country's microsatellite development program.

These developments prove two things: 1) That high-resolution images with high frequency can be possible, and 2) That it is possible for microsatellites to capture spectral images at several tens of bands (wavelengths) or higher. (S&T Media Service, DOST-PCIEERD)



# SCIENCE WEEK EXPLORING S&T IN THE NORTH

Matching today's lifestyle when technology serves people hyperconnected, DOST-I showcased, through exhibits and technology forum, the latest S&T innovations and technologies developed by DOST and science communities in the region.

BY MONETTE H. HERRERA, DOST-I

he cloudy weather and warning sign of heavy rains did not deter the Department of Science and Technology (DOST) in Ilocos Region to inspire generations of young and mature explorers with its weeklong celebration of this year's National Science and Technology Week (NSTW) from July 25 to 29 with the theme Juan Science, One Nation.

#### **Empowering MSMEs and partners**

On July 25, DOST-I launched its first-ever OneStore Hub in Ilocos Region located in Lingsat, San Fernando City, La Union. The hub is a part of e-marketing which will serve as the physical store where products from the different DOST-assisted micro, small and medium enterprises (MSMEs) regionwide will be consolidated, packaged, and shipped to online buyers.

According to Jamille Palpallatoc, project assistant III of DOST-II which developed OneSTore, consumers will have a reduced and easier time in shopping. OneSTore also guarantees that the shoppers' ordered products are ready for pick-up or will be delivered at their doosteps. She also assured that the products are safe, of good brands, and with good quality.



The CSI City Mall Atrium served as venue of the science and technology exhibits that marked the opening of NSTW on July 26. State Colleges and universities, partner agencies, and DOST-assisted MSMEs joined in the opening ceremony that featured the launching of the OneSTore e-commerce platform and the One Expert project.

Students, teachers, and other local visitors were amazed with the new technological advances and equipment at the OneLab while others flocked into the OneSTore booth to buy chichacorn, banana chips, camote chips, polvoron, taro chips, assorted honey products and others.

Herbal products like goat milk soap in different varieties were also on display while products of Nutridense Food Manufacturing Corporation like Rimo Curls, Brown Rice Bar, Momsie, and Iron Fortified Rice were likewise offered. Also, the Philippine Carabao Center of the Don Mariano Marcos Memorial State University sold carabao milk in different flavors to suit the taste buds of every customer.

Students from La Union National High School, Felkris Academy, and Saint Louis College in this city received brochures on DOST's scholarship programs plus tokens from the Philippine Science High School booth.

A regional quiz bee dubbed "Pinnasiriban 2016", organized by the PSHS- locos Sur Campus, also served as a highlight of the 2016 NSTW. Twelve elementary schools and 10 high schools, both public and private, chosen in the provincial level advanced and competed in the regional finals.

According to Dr. Ronnalee N. Orteza, PSHS-Ilocos Sur campus director, the Mother



Goose Special School System, Inc. (MGSSSI) Urdaneta Campus successfully bagged the first place under the Elementary Level Category. Second and third placers were the MGSSSI- San Carlos City Campus and BHC Education Institution, Inc., respectively.

For the High School Category, the BHC Educational Institution, Inc. in San Fernando City, La Union was declared champion. Landing on second place was the team from the Regional Science High School for Region 1 in patient data to allow health workers in remote communities to consult with specialists in urban areas.

#### S&T Fora

Also held was a Science and Technology Forum with topics such as the Free Public Wifi project, Tech4Ed project, Science and Technology Academic and Research-Based Openly Operated Kiosks (STARBOOKS), disaster preparedness, Eco-friendly septic system (Ecosep), plastic densifier and biogas, fertilizers

DEPARTMENT OF SCIENCE AND TECHNOLOGY HILIPPINE SCIENCE HIGH SCHOOL (DOST-PSHS)



Bangar, La Union and third place was Sarrat National High School in Ilocos Sur.

#### **RxBox experience**

Senior citizens, including employees from the private and public sectors, linedup for free BP check-up through the RxBox. This medical device has a built-in BP monitor, pulse oxymeter, electrocardiogram (ECG), fetal heart monitor, maternal tocometer, and temperature sensor.RxBox is also capable of storing and transmitting and plant growth enhancers, food products and processing, and scholarship.

## Recognizing Juan & Juana

The agency concluded the NSTW celebration by recognizing outstanding SETUP Adoptors led by MGN Frozen Foods as Best Regional SETUP Adoptor for 2015.

Likewise, DOST-I awarded support to DOST cooperators and Certficates of Appreciation to partners for the five-day event.

Partnerships to improve packaging and equipment will surely sizzle the dried fish industry in Santa Fe, Cebu.

# Good to go: AN INTRO TO TRANSPORT PACKAGING

BY LICINIO F. GINGOYON, DOST-VII

anggit and other dried fish coming from Santa Fe, Cebu will now reach supermarket shelves and kitchen tables in a better shape. The improvement in quality of dried fish coming from this Cebu town is boosted mainly by an upgrade in transport packaging offered to the Department of Science and Technology VII by a United Kingdom-based packaging company.

The Newton Packaging Limited, represented by its founder and director, Poon-Khim Ang, will provide packaging solutions, such as secondary and tertiary packaging, best suited to the dried fish products in the northern Cebu town.

Ang was one of the resource speakers in a series of forums held by the DOST VII in line with the celebration of the Regional Science and Technology Week (RSTW) in July 2016 at the Cebu Robinson's Galleria Atrium in Cebu City.

As part of its commitment, the packaging firm will introduce transport packaging designs to ensure protection and preservation of their goods while in transit through all points of the supply chain which includes different modes of transportation used in transporting the products.

Transport packaging provides cost-effective packing and logistical services to safely transport products using different types of materials (such as plywood, wood, corrugated, plastic, or steel). Varied types of materials are used for different types of transportation modes (airplane, truck, or boat) to secure the goods from damage.

Further, transport packaging also includes other services such as packing, kitting, warehousing, and containerization.

The collaboration between DOST VII and Newton



NEW PARTNER | Newton Packaging Ltd. Founder and Director Poon-Khim Ang explains to the audience the concept of transport packaging and its importance in securing goods and products in transit. The UK-based firm is DOST-VII's new private sector partner in pursuing its programs and projects.

Packaging is a spin-off of the regional office's existing tie with the DOW Chemical Pacific Ltd.. This US-based company agreed in principle to provide technical assistance to enhance the functional capability and efficiency of the hybrid solar fish dryer operated by municipal government of Santa Fe, Cebu.

Represented by its Singapore branch marketing manager, Eunice Ch'ng, DOW Chemical had made the pledge shortly before the celebration of the RSTW.

The cooperation between DOST-VII and DOW Chemical is part of the American company's program called the "Leadership in Action" (LIA) in which the DOST-VII is one its partners.

To boost the quality of dried marine products in Santa Fe, Ch'ng saw the need to improve the packaging of the town's dried fish products. This prompted her to bring one of her company's partners, the Newton Packaging, into the picture to help Santa Fe dried fish entrepreneurs in their business.

The company also agreed to redesign the hybrid fish dryer which the DOST-VII fabricated. The equipment applies combined heat sources using solar heater and furnace-type boiler to produce hot water as a heating medium of the dryer.

It is expected that, with the scaled-up hybrid dryer's improved capacity and efficiency, small enterprises in Santa Fe will increase the production of dried fish and other marine products.

With the proposed collaboration between DOST VII and its foreign partners, Santa Fe fisher folks and fish vendors can expect better marine products, significant increase in production, and vastly improved product packaging to make it competitive in local and international markets.

## Lessons from the past: UPHOLDING ETHICS IN TODAY'S HUMAN RESEARCH Dr. Manuel Emerson Donaldor athing I principles and guideling

BY LICINIO F. GINGOYON, DOST-VII

ne of the most controversial aspects of medical research is the ethical propriety of using humans as research subjects, giving rise to the need for strict adherence to the established principles in bio-etchics

This is one of the issues tackled in a forum that highlighted history and ethical principles of human research. The forum, organized by the Department of Science and Techology Regional Office VII, was held in July 2016 in observance of the Regional Science and Technology Week (RSTW).

Dr. Manuel Emerson Donaldo, research director of the Cebu Institute of Medicine and the forum's resource person, said ethical principles and guidelines in research involving human subjects are universally adopted to avoid repetition of the historical atrocities and injustices committed against human subjects in medical research.

Among these unjust and inhuman research practices, Donaldo pointed, were Nazi Medical Experiments in World War II (1939 to 1945) where prisoners of war were forcibly subjected to various experiments, many of which led to fatal results, solely for the benefit of German soldiers on the battlefield, and the Willowbrook State School Experiments in which live hepatitis virus were injected into mentally impaired children. Dr. Manuel Emerson Donaldo reminds us of the ethical principles and guidelines in research involving human subjects that are universally adopted to avoid repetition of the historical atrocities and injustices committed against human subjects in medical research.



ETHICS IN HUMAN RESEARCH AND EXPERIMENT | Dr. Manuel Emerson Donaldo, research director of the Cebu Institute of Medicine, engages the audience in an interesting discussion on the ethical issues in human research. He was the resource person during the RSTW forum on ethical principles in research involving human subjects.

# Medical atrocities in the Philippines

- a. US Army doctors infected five prisoners with bubonic plague and induced beriberi in 29 prisoners. As a result, four of the test subjects died.
- b. Professor Richard Strong of Harvard University in 1906 intentionally infected 24 Filipino prisoners with cholera without the consent of the patients and without informing them of what he was doing. All of the subjects eventually became sick and 13 died because of cholera.
- c. (Sources: When Doctors Kill: Who, Why, and How by Cina & Perper, 2010; Acres of Skin: Human Experiments at Holmesburg Prison : A True Story of Abuse and Exploitation in the Name of Medical Science by Hornblum, 1998)



He also mentioned the Jewish Chronic Disease Hospital Study where 22 elderly patients were injected with live cancer cells, the Tuskegee Study in which the research subjects composed of 600 poor illiterate Negro sharecroppers infected with syphilis were not treated because the objective of the experiment was to study the natural effects of untreated syphilis.

The horrible news about inhuman research and experiments sent shockwaves across the globe, prompting the United States government to create the National Commission for the Protection of Human Services of Biomedical and Behavioral Research and the Institutional Review Board, Donaldo said.

In 1978, the Commission published an official report on these experimental malpractices and declared a bioethics policy for adoption in the United States. In what later came to be known as the Belmont Report, the document outlined the ethical principles and guidelines for protection of human subjects.

The three basic ethical principles of research involving human subjects are: respect for persons, beneficence, and justice.

The first principle dictates that a research should protect the autonomy of all people and treat them with courtesy and respect. Researchers must be truthful, allowing for informed consent.

Beneficence should be shown by living up to the philosophy of "Do no harm" by "maximizing benefits for the research project and minimizing risks to the research subjects."

Justice, on the other hand, requires researchers to ensure "reasonable, non-exploitative, and well-considered procedures are administered fairly — the fair distribution of costs and benefits to potential research participants — and equally."

Expounding on the declared principles, Donaldo explained that in respecting a person's autonomy, a researcher must consider the subjects' mental capacity which affects their ability to understand and process information which, in turn, affects their voluntariness and ability to give informed consent.

He also stressed that beneficence, in the context of ethical research, means an obligation to exert reasonable efforts to protect the research subjects from harm and protect their well-being.

Finally, in explaining justice in the principle, Donaldo posed this question: "Who ought to receive the benefits of research and bear its burdens?"

An injustice occurs when a person is denied the benefit due him for having had to bear a burden that brings great benefits to other people, he added.

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DOST -X Regional Director Alfonso P. Alamban, Cepalco SVP Ralph Paguio, and Engr. Elpidio Paras cut the ceremonial ribbon for the opening of the exhibit.

ur aim is to bring down the fruits of these developments to every Juan on the streets or barangay. For only through a secured economic and social well-being can we have a united and contented citizenry," said Department of Science and Technology (DOST) X Regional Director Alfonso P. Alamban in his opening remarks for the 2016 National Science and Technology Week (NSTW) dubbed as "Juan Science, One Nation."

Held at the Grand Caprice Hotel in Cagayan de Oro City, the event was a flurry of activities which showcased the various DOST programs and how these have made an impact in the lives of the locals.

Among others, the Science Department has helped up the ante or product quality and production processes among several micro, small, and medium enterprises (MSMEs) in the region via its Grantsin-Aid (GIA) program and Small Enterprise Technology Upgrading Program (SETUP) – two of DOST's major programs which provide assistance to small entrepreneurs via funding, technology upgrade, and manpower training.

To highlight this positive impact on MSMEs, DOST announced its best technology adopters in Region X in a ceremony held as one of NSTW's activities during its four-day celebration. Taking the top plum as DOST-X's Best SETUP Adopter was Bukidnon's Cakeboom and Party Flavors, makers of the famous piñasitas, a pastry with pineapple filling; and piñakasi, coined from "piña" and "kasi"  acronym for kalamunggaysquash. Earlier, Cakeboom was cited as Bukidnon's best.

Also competing for regional honors was Lanao del Norte's Best SETUP Adoptor Manga Miyamaratiyaya Ki Isa, Inc. (MMKI), a churchled foundation providing livelihood for Maranao, Bisaya, and Higaonon farmers of Digkilaan, Iligan City by processing tea from locally available herbs.

Also recognized was the local government unit of Malaybalay City for reaping two Best GIA Program awards: for its Essential Oil Production in Mt. Kitanglad Range National Park, and its Establishment of 1-ton Bioreactor & Plastics Densifier: A Solid Waste Management Strategy of LGU Malaybalay City.

Additional awards were also given to 13 A1 projects with on-time refund, no extension, no restructuring and 10 completely refunded projects.

The Philippines' future young scientists and researchers were also recognized during the event.

The Youth Excellence in Science award was given to five students from City Central School, Liceo de Cagayan University, Rosevale School, Philippine Science High

# **RxBOX HELPS** in safety of moms and babies

BY MIKE BAÑOS, DOST-X

#### "It's truly a life-saving device especially for our birthing homes and health centers."

he first recipient of the Department of Science and Technology's RxBox in Region X has nothing but raves for the versatile multi-purpose diagnostic device.

"It's an all-in-one super device," said Dr. Siegfried Hector B. Razo, municipal health officer of Kinoguitan, during the National Science & Technology Week (NSTW) 2016 celebration in Region X from July 23-26, 2016.

The rural health unit of Kinoguitan, Misamis Oriental (RHU-Kinoguitan) is the first recipient of the RxBox which can store and transmit a patient's data to allow health workers in remote communities to consult with medical specialists in distant urban centers.

RxBox has built-in medical sensors for monitoring blood pressure and blood oxygen levels, temperature, assessing the strength of contraction of the mother's uterus, fetal heart monitor, and an electrocardiogram.

RHU-Kinoguitan is using the RxBox mainly to monitor the health of pregnant women who are about to give birth.

"It's truly a life-saving device especially for our birthing homes and health centers," Razo elaborated.

"We have pregnant patients who are sickly, so the RxBox enables us to monitor the health of both the mother and her baby," he continued. "Since we are just a primary healthcare



DOST-X RxBox Project Assistant Laarni Navales demonstrates the use of the RxBox onstage during the launch of the device as part of the NSTW 2016 celebration. (Photo by Mike Baños, NPN)



Kinoguitan Municipal Health Officer Dr. Siegfried Hector Razo demonstrates the use of the RxBox with DOST-X RxBox Project Assistant Laarni Navales during the NSTW 2016 exhibit at Grand Caprice, Limketkai Center. (Photo by Mike Baños, NPN)

facility, it enables us to refer the patient to tertiary hospitals like the Northern Mindanao Medical Center in Cagayan de Oro where they can [get] access to better medical facilities and health care."

He added that RxBox makes them better informed in cases when they have to refer a patient to a higher level institution or doctor before anything goes wrong. "As a primary health care center, we strengthen our referral system through the RxBox," Razo stated.

So far, the DOST has programmed 1,000 RxBox units for distribution to priority municipalities all over the country. In Northern Mindanao, 65 of 75 applications for RxBox filed by municipalities have been approved for distribution by September 2016, according to Engr. Romela Ratilla, RxBox project coordinator for Region X.

Pending the upgrade of better communications infrastructure, RHU-Kinoguitan has not yet been able to directly link to medical specialists in Cagayan de Oro but expects this to be operationalized as soon as one of the major telecom players in the region completes the installation and commissioning of its fiber-to-the-home system in Northern Mindanao.





A fiesta-themed 2016 NSTW celebration for DOST - X held at Grand Caprice, Limketkai Center, in Cagayan de Oro City. Inset shows the exhibit area with its own fiesta trimmings.

S&T Ambassador for Business Sector and DOST-X keynote speaker Engr. Elpidio M. Paras, deliver his opening remarks during the opening ceremony.

School-Central Mindanao Campus, and Tambo Central Elementary School. The students – who won gold, silver, and bronze medals in international competitions received the award for their exemplary achievement in science and mathematics.

Also part of the NSTW celebration was the DOST X Quiz Bowl where 31 schools participated. The sister cities of Iligan and Cagayan de Oro each took home the championship.

For the elementary level, Oro Christian Grade School topped the final round to emerge as champion. The team members were Ethan Rey Dominic Magaro and Raphael Joseph Gaane, with Wenelyn Obguia as coach.

City Central came in second while XUGS made it to third place.

In the high school level, Mindanao State University-Iligan Institute of Technology College of Education-Integrated Development School (MSU-IIT CED IDS) made it to the top. The team was composed of Abdel-Nasher S. Tanggor and Ronald Stephen A. Galorio, with Odyssa Natividad M. Molo and Ivy Claire V. Mordeno as coaches.

Meanwhile, the most visited booth in the exhibit was the RxBox, one of DOST's initiatives for a "Smarter Philippines."

The machine features a multicomponent program (biomedical device, electronic medical record system and telemedicine training) designed to provide better access to life-saving healthcare services in isolated and disadvantaged communities nationwide. The record system can store and transmit a patient's data to allow health workers in remote communities to consult with medical specialists in distant urban centers. An all-in-one medical device, RxBox has an electrocardiogram (ECG), blood pressure monitor, pulse oxymeter to monitor a patient's oxygen levels and pulse, fetal heart monitor, maternal tocometer, and temperature sensor.

"It's truly a life-saving device especially for our birthing homes and health centers," said Dr. Siegfried Hector B. Razo, municipal health officer of Kinoguitan, Misamis Oriental, the first recipient of the RxBox.

RxBox is an ICT (information and communications technology) innovation designed to support the Department of Health's call for Kalusugang Pangakalahatan or Universal Health Care.

Another DOST technology that caught everyone's attention was the silk worms of DOST's Philippine Textile Research Institute (PTRI).

"Silk production is an environmentally sustainable enterprise and gives livelihood to rural people specifically the Laguindingan Silk Weavers. Even if the silk industry may appear to be a minor textile sector, silk has the reputation of being a luxury textile that has a high-end market," said Sheryl Lopez of PTRI.

The silk yarns are ideal for gowns, barongs, and other garments requiring the finest quality fabrics. In fact, the barong worn by President Rodrigo R. Duterte during his inauguration last June 30, 2016 was from Laguindingan Silk Weavers. Signifying his interest to venture into this business was Donald Jay Antipasado who already has an embroidery engagement in Malaybalay City.

In addition, forums were also conducted tackling diverse topics such as innovation and technology, solar energy, disaster prevention and mitigation technologies, and solid waste management.

Based on records, 4,363 visitors composed of students, entrepreneurs, LGU representatives, people with disabilities, and innovators came to the exhibit area which featured a total of 19 exhibitors.

The event was a full-pact celebration nationwide where DOST was able to make every Juan and Juana feel the impact of science in their everyday lives.

As Engr. Elpidio M. Paras, regional S&T ambassador for business community sector, said during the opening ceremony, DOST has put the country's science, technology and innovations in the limelight thru landmark achievements. Paras acknowledged DOST's efforts under the leadership of former Secretary Mario G. Montejo, himself an inventor and innovator with an entrepreneurial background.



Chef Boy Logro demonstrates food safety while cooking pork baby back ribs.





Chef Boy Logro receives token from Winrock International, DOST's partner organization for the campaign.

Mr. Anthony Joseph Lucero of PAGASA receives plaque of appreciation from DOST-Caraga Regional Director Dominga Mallonga.

# DOST CARAGA WHIPS UP A WONDERFUL MENU FOR RSTW

BY GABRIELLE T. ESPINOSA, DOST-CARAGA

The 2016 RSTW in Caraga generated public awareness through a delightful menu of programs and services as well as achievements of DOST. And the audience couldn't just get enough. OST-Caraga successfully hosted the week-long celebration of the National Science and Technology Week on July 22-25, 2016 at the Robinsons Place in Butuan City. Bannered by the theme "Juan Science, One Nation", the celebration illustrated how science, technology, and innovation contributed towards a better environment and change in people's lives.

#### **Project launching**

DOST Caraga launched the new projects during the opening ceremony of the first day of the celebration. Ms. Dominga D. Mallonga, Caraga regional director, together with the guest speaker Anthony Joseph Lucero of PAGASA, unveiled RxBox, eHatid, OneSTore, and One Expert to signify the start of the projects' implementation.

#### Best SETUP Adopter

DOST Caraga recognized Geronimo Autor of the Gold N' Pearl Bakeshop as the Best SETUP Adopter for 2015. Mr. Autor started availing himself of the SETUP program in 2012 and eventually enhanced their food processing and production. A 2-million peso check has been awarded to him during the opening ceremony.

Science and technology contests

The Quiz Bowl and Extemporaneous Speech Contest tested the high school and elementary students' wit and knowledge in science and technology. The competitions were held during the second day of the 2016 NSTW celebration. About 63 elementary students from all over the region participated the Quiz Bowl Contest, while 16 High School students battled during the Regional Extemporaneous Speech Contest.

#### **Food Safety Fair**

The Caraga Food Safety Team, in partnership with Winrock International, organized the food safety fair during the third day of the NSTW 2016 celebration to promote food safety in the region. The food safety forum gathered the different key stakeholders from the different sectors of the region to discuss about addressing challenges confronted by the food safety of the region.

In line with this activity, DOST with Winrock International as partner launched the Food Safety Awareness Campaign. Daniel Gudhal, Winrock International's chief of party, together with DOST, unfurled the brand logo of the Food Safety Campaign. Chef Boy Logro of GMA-7 also demonstrated Food Safety Cooking after the campaign was launched in Robinsons Place, Butuan City.



Unveiling of the campaign brand Food Safe Caraga



Unveiling of the campaign brand Food Safe Caraga



DOST 13 RD Dominga Mallonga congratulates the top three winners of the Regional S&T Extemporanous Speech Contest

#### **Food Safe Caraga**

By IRISH JANE N. CALUNGSOD, DOST-CARAGA

Stories of people experiencing food poisoning and related food borne illnesses are becoming common in the community. These may not happen every day in the place we live in, however, this becomes a big deal when food poisoning outbreaks happen.

In 2015, candies which downed over 1,600 people in some provinces in Caraga alarmed the nation. While actions have been made after the incident, the food regulatory system focusing on food safety in the region leaves much to be desired, more importantly in the areas of production where ensuring safety is at a critical level. Same is true at the commercial and household levels in the region where food safety as an issue should also be pondered.

The candy incident in Caraga is only one of the thousand incidents of food poisoning that could happen around the world. Finding out the causes may answer the question, but preventing such is another story.

Earlier this year, Winrock International- Philippine Cold Chain Project, which is based in Caraga, partnered with the Department of Science and Technology-Caraga through the Caraga Food Safety Team in promoting food safety in the region through an information, education and communication campaign.

The campaign sought to contribute and strengthen the food safety regulatory system by promoting and supporting improved practices in food production, handling and marketing to ultimately protect the health and general welfare of consumers.

This campaign, dubbed as "Food Safe Caraga" was officially launched on July 24, 2016, as part of the Food Safety Fair during the third day of the National Science and Technology Week held at the Robinson's Place in Butuan City.

The one-day fair highlighted two major activities, the Stakeholders Forum on Food Safety, which was attended by about 100 participants from government and non-government agencies and small-scale food processors in the region. The forum was able to bring up issues regarding the cleanliness of public markets and the possible interventions that S & T could offer.

In the afternoon, the launching of the campaign took place where Chef Boy Logro, the Kusina Master, held a cooking demonstration. Likewise, Daniel Gudahl of Winrock-International PCCP Chief of Party and Engr. Andrea Cabonita of DOST-CFST participated in the unveiling of the "Food Safe Caraga" campaign brand.

Initial steps were made to fast-track the activities of the campaign which include trainings for meat stall vendors, owners and processors, as well as the general public.

The campaign is expected to end in 2017, wherein Caraga is expected to be safer when it comes to food handling and distribution.



# MECHATRONICS CHALLENGE ROCKS THE CORDILLERA RSTW

BY SHAI MARIE SINGA-CLAVER, DOST-CAR

Students teamed up not to represent their schools but to pool together their strengths and skills to come up with winning mobots for disaster preparedness ngineering and technical students from the CAR banded together to respond to a challenge posed by DOST-Cordillera Administrative Region during the regional celebration of the Science and Technology Week.

Coming from the Saint Louis University, University of the Cordilleras, and University of Baguio, the 23 students were on their 4th and 5th year and enrolled in engineering or technical/vocational courses specializing in mechanical, electronics, communications, electrical, computer and graphic arts.

The students came in as participants to the DOST-CAR Mechatronics Challenge for Disaster Prevention, Mitigation and Rescue Operation held July 27, 2016 at the Benguet State University Gymnasium in La Trinidad, Benguet.

To maximize the strengths of the participants, the competition grouped the contenders not according to university but rather into five teams composed of students in varying fields.

The following were the participating teams: Team Organic with James Li W. Nievera, Jhoren Paul P. Desierto, James Algernon D. Cangat, Christian Jarren E. Dacanay, Andra Marie B. Garcia; Team Parokya ni Chito with Caseylou M. Dampac, Charlie E. Asuncion, Jovelito Rey R. Corpuz, Allan Bernard N. Char; Team Toretto with Chito A. Saing, Klaudine June G. Obedoza, Abraham P. De Guzman Jr., John Wesley D. Antonino, Jamie Mae G. Atayoc;

Team Black Label with Kelvin John V. Mabborang, Edward P. Saldivar, Jr., Jemuel Jahleel B. Valencia, Glen V. Rabina, and, finally, Team 5 with Melvin Jay B. Singwa, Danmer A. Espiritu, Giselle Anne Ronquillo, Vanjo T. Arellano, Sherwin Francis Y. Ninalga.

The students went through orientation and related lectures earlier at the DOST-CAR Conference Hall and also received kits.

They also did the design and assembly at the agency supported Inventor's Common Service Facility at the PSTC-Benguet from July 23-25, 2016.

Winners were determined based on the shortest time their mobots were able to accomplish the required task for the two contested categories. These were Level 1- Bomb Blast Mitigation, and Level 2- Disaster Rescue.

Two scenarios were provided. For Level 1, the teams must cover the "bomb" using their respective mobots.For level 2 under the disaster rescue category, the mobots must pull the trapped dummy from under the table.

Team Toretto got the top prize for Level 1, followed by Team Organic and Team Black Label. For Level 2, the first place went to Team Organic, followed by Team Black Label and then Team Toretto. The special award for the Best Design was given to Team Parokya ni Chito. Aside from certificates of award, Team Toretto received PhP10,000.00 while Team Organic and Team Black Label received PhP7,000.00 and PhP5,000.00 respectively.

On the other hand, Team Organic received PhP15,000.00 while Team Black Label and Team Toretto received PhP10,000.00 and PhP7,000.00 respectively. Team Parokya ni Chito meanwhile received PhP5,000.00.

DOST, being the vicechair for Disaster Prevention and Mitigation as embodied in RA10121, included the competition as an activity in the RSTW in the region as the event was celebrated in July, the National Disaster Consciousness Month,

Partnering with DOST in the RSTW was the CAR-Federation of Inventors who provided guidance to the participants in the fabrication of their devices, particularly during the three-day design and assembly prior to the RSTW.

Aside from the mechatronics competition, DOST-CAR also sponsored various activities These include the SETUP Summit and the Launching of the One Expert and One Store; technology trainings on DRRM, Packaging and Labeling, Good Agricultural Practices, Consumer Awareness: Pathway of Pesticides on Food and Food Products, Food Safety; S&T Exhibit and Techno Bazaar; S&T Quiz and Trivia for elementary and secondary students; and the Stakeholders' Night on June 27 to cap the three-day event.





# SYENSAYA MEETS SIPAG NI JUAN IN LB SCIENCE COMMUNITY'S NSTW

BY RICARDO R. ARGANA & ROSE ANNE M. AYA, DOST-PCAARRD



Left photo (from left) ASEAN Centre for Biodiversity Liaison and Protocol Specialist Lauro S. Punzalan, PCAARRD Deputy Executive Director for R&D Edwin C. Villar, PCAARRD Applied Communication Division Director Marita A. Carlos, Los Baños Mayor Caesar P. Perez, LBSCFI President Casiano S. Abrigo, Jr., and PCAARRD Deputy Executive Director for Administration, Resource Management and Support Services Danilo C. Cardenas formally open the 2016 SyenSaya Wonderama exhibits. Right photo: Mayor Caesar P. Perez, Dr. Villar, Dr. Abrigo, and Mr. Punzalan open PCAARRD's SIPAG ni Juan exhibits at the DOST-PCAARRD Innovation and Technology Center. (Photos by Victor V. Oro, ACD-PCAARRD).

> he Los Baños Science Festival dubbed as SyenSaya, and SIPAG ni Juan, a science and technology transfer commercialization strategy of DOST- PCAARRD (Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development) served as backdrop for this year's National Science and Technology Week celebration at the Los Baños Science Community (LBSC) held at the PCAARRD Complex in Los Baños, Laguna.

LBSC is composed of PCAARRD, DOST-Forest Products Research and Development Institute (FPRDI), and DOST-IV.

Adopting the theme "Juan Science, One Nation," LBSC's celebration held July 25-29, 2016 featured forums, awarding c3eremonies that recognized the top research outputs, the anniversary bash of both PCAARRD and the LBSC Foundation Inc (LBSCFI), and exhibits from LBSCFI and its member-agencies as well as the Southern Tagalog Agriculture, Aquatic and Natural Resources Research and Development Consortium.

## National Scientist and disaster risk forums

Two interesting and practical forums were held: one which highlighted the careers and groundbreaking works of three of the country's National Scientists, and another which focused on disaster risk management.

In Trailblazers in Science: National Scientists Lecture Series, National Scientists Dr. Gelia T. Castillo, Dr. Bienvenido O. Juliano, and Dr. Ramon C. Barba shared tidbits about their professions with students and other forum participants. In particular, Dr. Castillo shared her journey toward becoming a National Scientist and her prominence in the global health research industry. On the other hand, Dr. Juliano shared the findings of his study titled Rice Grain Qualities: Cooking and Eating Qualities. Meanwhile, Dr. Barba shared information about his study on mango flowering induction.

In the disaster risk and reduction management forum organized by the LBSCFI, four barangays presented their best practices in addressing calamities such as floods, erosion, earthquake, and fire. These were Barangays Putho-Tuntungin, Lalakay, Batong Malake, and Bambang. Their best practices were assessed by a panel of evaluators composed of Dr. Bonifacio G. Pajuelas, officer-in-charge-NCR of PAGASA, regional services division; Michiko R. Escalante of DILG, Region IV-A; Leticia T. Diokno, regional director of DSWD, Region IV-A; and Gina T. Gacusan, assistant regional director of NEDA IV-A.

DOST Secretary Fortunato T. de la Peña is briefed on the raft method of growing oysters during his visit at the DPITC. (Photo by Victor V. Oro, ACD-PCAARRD)

#### 2016 NSAARRD

Also held during the NSTW was the 2016 National Symposium in Agriculture, Aquatic and Natural Resources Research and Development.

The symposium recognized the research of the University of Southern Mindanao (USM) titled Validation of Varietal Integrity of Promising Rubber Clones through DNA Fingerprinting. Led by Dr. Emma K. Sales of USM, the study was awarded as the Best Research Paper under the Research Category.

The research helped in

NATIONAL SCIENTIST BIENVENIDO O. JULIANO ensuring the quality and integrity of rubber planting materials produced by clonal gardens and nurseries through DNA fingerprinting. This can assure farmers that their planting materials are genuine and can enhance crop productivity.

Meanwhile, the Southern Philippines Agri-Business and Marine School of Technology (SPAMAST) was awarded as the Best Paper under the Development Category for its project Science and Technology Community-Based Farm Coco Sap Production and Technomart Projects: Propelling Coco Sugar Industry Development in Davao del Sur. Dr. Augie E. Fuentes, research, development and extension director of SPAMAST, led the project.

The STCBF research yielded a 43.64 percent increase in the number of accredited and organized coco sap gatherers. It also helped in packaging and marketing Davao del Sur's cocosugar products which are

# SCIENTISTS LECTU

July 27, 2016 WDDar Room, DOST-PCAARRD, Los Baños

National Scientists (from left) Gelia T. Castillo, Bienvenido O. Juliano, and Ramon C. Barba. (Photo by Victor V. Oro)

JUL-SEP 2016 27

Mayor Caesar P. Perez of Los Baños, Laguna (left photo) discusses disaster risk and reduction management in front of barangay officials (right photo) to keep them abreast of how the local government addresses the issue with the help of the barangays. (Photo by Victor V. Oro, ACD-PCAARRD)

now exported to the United States, Australia, Germany, and United Kingdom.

#### LBSCFI and PCAARRD's anniversaries

LBSCFI also celebrated its 32nd anniversary on July 25, 2016 at R.D. Guerrero III Hall of DOST-PCAARRD's Innovation and Technology Center (DPITC) while PCAARRD celebrated its 5th anniversary on July 28, 2016 at the Elvira O. Tan Hall.

During the LBSCFI anniversary, DOST Secretary Fortunato T. de la Peña, through Undersecretary Carol M. Yorobe, lauded the foundation's 22 member agencies for inter-agency cooperation, collaboration, and sharing of resources to make a strong R&D community.

Now composed of 22 public and private agencies,

Department of Science and Technology (DOST) Undersecretary Carol M. Yorobe delivers the keynote message of Secretary Fortunato T. de la Peña during the Los Baños Science Community Foundation Inc. (LBSCFI) 32nd Founding Anniversary celebration. (Photo by Victor V. Oro, ACD-PCAARRD)

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LBSCFI has, through the years, accumulated a rich resource of research and development information. LBSCFI Outstanding Research and Development awards, particularly the F.S. Pollisco Research and Development Award and the Philippine Agriculture and Resources Research Foundation, Inc. Research and Development Award, which are given yearly in time for NSTW, have been instrumental in the generation of this information.

Also keynoting the PCAARRD anniversary, Secretary de la Peña urged a staunch research and development stance for the agriculture, aquatic, and natural resources research sectors.

Speaking before PCAARRD officials and staff, representatives from the Council's partner agencies, scientists, researchers, academicians, and the media, de la Peña congratulated the Council for having continually pursued a focused and meaningful research and development undertaking for the AANR, even as he urged the Council and its partners for an intensified and vigorous R&D stance.

De la Peña challenged the Council and its partners to further intensify its share in alleviating poverty, especially in the countryside, as he inspired them with the hope of millions of Filipinos that change is coming, particularly in terms of government's role in poverty reduction through science and technology.

Borrowing the words of President Rodrigo R. Duterte, de la Peña prompted the Council "to distribute science initiatives to the regions, especially where food production needs to be improved, where industry needs to grow, and where innovation needs to be developed."

# Closing and gearing up for another year

The five-day celebration officially closed on July 29 with several activities. One of these was the awarding ceremony in recognition of exceptional research and development initiatives.

Formally recognized were the papers Mapping and Monitoring Rice Areas in the Philippines: the Prism Project Experience of the International Rice Research Institute and the Bio-ecological Characteristics of Migratory Waterbirds at Priority Wetlands in Relation to Climate Change of the Ecosystem Research and Development Bureau.



Department of Science and Technology Secretary Fortunato T. de la Peña (center) and DOST-PCAARRD Acting Executive Director Reynaldo V. Ebora (beside de la Peña) with the awardees of the 2016 NSAARRD and the Elvira O. Tan Award. They are (from left) Dr. Jaime C. Cabarles, Jr. - Central Philippine University; Dr. Erlinda A. Vasquez - Visayas State University; Dr. Clarissa Yvonne J. Domingo - Central Luzon State University; Dr. Emma K. Sales - University of Southern Mindanao; Dr. Hermogenes M. Paguia - Bataan Peninsula State University; Dr. Augie E. Fuentes - Southern Philippines Agri-Business and Marine School of Technology; Sweedy Kay L. Perez and Roselyn D. Aguila - Bureau of Fisheries and Aquatic Resources; and Dr. Nila Nanette S. Revilla. (Photo by Victor V. Oro).

The said papers were awarded the PARRFI R&D award and the F.S. Pollisco Award, respectively.

The Youth Science award and the Outstanding Research for Los Baños Development award, were also launched during the closing ceremony.

Also highlighting the closing ceremony was

the turnover of LBSCFI stewardship by its outgoing president, Dr. Casiano S. Abrigo Jr. of the UPLB Foundation, Inc., to Dr. Alexander R. Madrigal of DOST Region IV-A.

In his keynote message, Jim Leandro Cano, Philippine country representative of the Young Professionals for Agricultural Development (YPARD), underscored the important role of science and technology institutions and their partners in changing the society through productive research and development initiatives, including the prompt delivery of their results to intended beneficiaries.

Meanwhile, in his closing remarks, PCAARRD Acting Executive Director Dr. Reynaldo V. Ebora recognized LBSCFI's common effort. He also summed up LBSCFI's numerous accomplishments in terms of bringing science to the people of Los Baños, as a tool for livelihood opportunities, and for having helped instill in the youth the love for science. Ebora challenged the Los Baños Science Community to explore the endless frontier of science as a source of vast opportunities for Filipinos, particularly in determining what aspect of human activity can be made more convenient and productive through innovation.

"PCAARRD continually rises to the challenge of community empowerment by addressing poverty through the needed science and technology interventions for the agriculture, aquatic and natural resources sectors," Ebora said.

Dr. Alexander R. Madrigal (left) receives the LBSCFI flag from Dr. Casiano S. Abrigo, marking the official turnover of the Foundation's stewardship to DOST IV-A (Photo by Victor V. Oro)



Advanced Science and Technology Institute (ASTI) Acting Director Dr. Joel Joseph S. Marciano Jr. gives his welcome remarks during the ASTI Technology Transfer Day. (Photo by Mylene N. Monton, S&T Media Service, DOST-ASTI)



(From left) Ace Electronic Technology Inc. Assistant Vice President Maribelle Sy-Uy and President Alex S.E. Sy, together with Dept. of Science and Technology-Advanced Science and Technology Institute (DOST-ASTI) Acting Director Dr. Joel Joseph S. Marciano Jr., Ph.D. and Technology Licensing Office Chair Alvin E. Retamar, sign the Technology License Agreement (TLA) for the Advanced Remote Data Acquisition Unit (arQ) during the ASTI Technology Transfer Day on July 28, 2016 in Quezon City – one of the activities during the 2016 National Science and Technology Week in the QC Science Community. The arQ is the datalogger used in the ASTI-developed weather stations deployed nationwide. (Photo by Mylene N. Monton, S&T Media Service, DOST-ASTI)

# **PUSHING THE ENVELOPE FURTHER: ASTI VENTURES INTO LICENSING**

**BY KATHERINE B. RAMOS,** DOST-ASTI and **ESPIE ANGELICA A. DE LEON,** DOST-STII

One of the highlights of Technology Transfer Day, and of perhaps the entire NSTW celebration in QC, was the signing of a Technology Licensing Agreement between ASTI and Ace Electronic Technology, Inc. – the first time ASTI was venturing into licensing.

> n July 28, 2016, representatives from local electronic companies and system integrators flocked to the office of the Department of Science and Technology-Advanced Science and Technology Institute (DOST-ASTI) in Quezon City to learn about licensing opportunities involving weather stations.

It was the Technology Transfer Day at ASTI, one of the events under the National Science and Technology Week (NSTW) celebration at the QC Science Community.

One of the highlights of Technology Transfer Day, and of perhaps the entire NSTW celebration in QC, was the signing of a Technology Licensing Agreement (TLA) between ASTI and Ace Electronic Technology, Inc. It is the first time ASTI ventures into licensing.

Under the agreement, ACE will manufacture, market,

sell, and distribute the ASTIdeveloped Advanced Remote Data-Acquisition Unit or arQ, to local electronic companies and system integrators.

The arQ is a data logging device, which can be configured to acquire, record, store, and send data. It is used in all the weather monitoring devices developed and deployed nationwide by ASTI, which are part of the Philippine government's program in strengthening the country's disaster management and mitigation capabilities.

Among these weather monitoring devices by ASTI are automated weather stations, automated rain gauges, agrometeorological stations, water level monitoring stations, tsunami early warning stations, and urban flood monitoring stations.

"This day is an opportunity to share this technology, the arQ, which is the heart of all weather stations developed by ASTI," said ASTI Acting Director Dr. Joel Joseph S. Marciano, Jr. during his welcome remarks at the signing.

To date, the number of government-deployed stations total to almost 2,000 units. Meanwhile, ASTI has deployed weather monitoring devices for various organizations totaling 126 units to date.

With the invention of arQ and the signing of a TLA to make the data logging device more readily available in the market, local efforts for disaster preparedness and mitigation are stepping up.

Since ASTI's mandate should be focused on research and development, these technology breakthroughs must be sustained thru technology transfer initiatives. ASTI's Technology Licensing Office sees the licensing of the arQ datalogger as the next logical step.

Science Journalism Writeshop SHARING SHARING THE SCIENCE GOSPEL'

BY ALLAN MAURO V. MARFA, DOST-STII



As the bridge of knowledge between scientists and people, science journalists have the responsibility to deliver information and knowledge in the simplest, and most creative and accurate way possible.

asa Siyensya ang Pagasa." This is the dictum that defines all the programs of the Department of Science and Technology (DOST) which are all geared towards building a progressive living environment for every Filipino.

Research has proven that our local farmers could increase their yield annually with the help of the newly discovered local farming techniques and tools. Local engineering research could likewise help improve the traffic situations in Metro Manila. Some ICT-enabled applications developed in the country can be used to make educational and medical services more accessible to people in remote areas, as well as to provide employment opportunities.

We have seen many world-class and life-changing products developed by our Filipino engineers and scientists through the years. However, the huge challenge is for the products to reach target beneficiaries.



## Science Journalism Writeshop

This is where the role of science journalists is very vital. As the one who bridges the knowledge between scientists and specific audiences, the science journalist has to deliver information and knowledge in the simplest, most creative, and accurate way possible.

## Training future science journalists

In order to discover and arm the next generation of science communicators in the country, the Department of Science and Technology-Science and Technology Information Institute (DOST-STII) designed a training program called Science Journalism Writeshop which was launched last year during the celebration of the National Science and Technology Week.

The one-day training was by invitation but during the actual day, too many eager participants came, turning them into an SRO audience. Those who could no longer be taken in because there was no more space were advised to request for a writeshop to be held in their own campuses. Three more writeshops were held thereafter in Adamson University, Batangas State University and in Calbayog, Samar which catered to professional journalists wanting to enrich their science reporting.

During the 2016 NSTW, STII held the Science Journalism Writeshop again to broaden its network of partner institutions in disseminating science and technology information. Entitled #Sciencejournoako, the writeshop was held July 28 at STII Mini-Theatre in Bicutan, Taguig City.

Participants were selected campus journalists and communication students from different universities and colleges in Metro Manila and nearby provinces.

Dr. Aristotle P. Carandang of DOST-STII said that the writeshop allows the studentjournalists to learn the importance of S &T in making the community a better place.

"Science journalism is more than just giving out the information on biotechnology or robotics. It should also be timely and easily understood by the average Filipino. It should consist of a package that provides accurate information that is complete and presented in a lively and interesting manner," Dr. Carandang added.

He stressed that this is the reason why DOST-STII wants to equip them with knowledge on how to prepare articles that would appeal to the general public.





Lea Baroña-Cruz, senior communication specialist from International Rice Research Institute (IRRI), gives some valuable tips in terms of writing quality science stories to the student-participants of #Sciencejournoako: A Science Journalism Writeshop last July 28 at STII Mini-Theater in Bicutan, Taguig City. (Photo by Allan Mauro V. Marfal)



Joel Adriano, senior writer from SciDev.net, gave his comments to the output of selected participants of #Sciencejournoako: A Science Journalism Writeshop last July 28 at STII Mini-Theater in Bicutan, Taguig City. (Text and Photo from Allan Mauro V. Marfal, S&T Media Service)



To come up with quality and accurate science stories, studentparticipants of #Sciencejournoako ask follow-up questions and verification from Dr. Gil L. Magsino of National Crop Protection Center • University of the Philippines-Los Banos regarding to the carrageenan plant growth regulator project of Department of Science and Technology (DOST). (Photo by Allan Mauro V. Marfal)

# Art of gathering information

During the said writeshop, seasoned science journalists shared their experiences as practitioners and the various techniques that journalists can use to come up with high quality and effective S&T stories.

Joel Adriano, SciDev.net regional coordinator for South East and the Pacific, admitted that writing a science story is such a tough task, especially when you are not familiar with various scientific concepts.

According to Adriano, in order to produce high quality S &T stories, researching and collecting information thru interviews with subject matter experts are still the most ideal ways for a science journalist to understand the concept of certain topics.

"If you want to come up with a really good science story, conducting interview directly with resource persons is the most advisable," he suggested.

Adriano explained that talking directly with reputable sources will give science journalists more opportunities to understand the topics completely, making the article highly credible. However, Adriano stressed that successful interviews, whether short or full interviews, are not happy accidents-- they require preparation.

"You have to research on the interview topic and the person to be interviewed so that you can ask intelligent questions and understand the answers. Aside from that, you can show to the interviewee that you have taken the time to understand the subject and also that you cannot easily be fooled," Adriano said.

Meanwhile, Adriano also gave pointers on formulating good questions for interviews. One of these is avoiding roundabout questions.

"Don't ask questions that are answerable by a simple 'yes' or 'no'; start with 'how', 'why', or 'what do you think about'. Keep it simple and short; ask the question and don't offer potential answers," Adriano explained.

He then summed up that the main purpose of interviewing a subject matter expert is to learn something. Having said this, it is alright to ask a follow up question if the answer seems vague or complex.

# Humanity and authenticity

While Adriano dealt with the technical aspect of science writing, Lea Barona-Cruz, senior communication specialist from International Rice Research Institute, tackled the importance of the authenticity and humanity of writing science articles.

According to her, disseminating wrong information and incorrect misconception to the public is a red flag when it comes to writing articles. She understands that science journalists want to simplify certain concepts such that these are presented creatively, but the accuracy of the article should not be compromised. She added that it is best to consult a subject matter expert if one is unsure about its perception on some concepts.

In order to make an article more appealing, Cruz advised science journalists to explain the benefits that people can get from technology, such as how it will improve their lives. She challenged the participants be creative in finding story angles that will make people believe that this technology is one answer to their problem.

The writeshop indeed delighted participants who

expressed that they were satisfied with all the new bits of information that they got from the workshop.

"This science journalism writeshop has provided the participants tons of new ideas and I believe that this type of activity should be given more prominence. At the same time, (it gave) more opportunities because science writing is definitely something that could help the country to move forward," said Rex San Diego of the Ismael Mathay Science High School, one of the participants.

Maye Fernado-Villanueva, another participant and a student from Dalubhasaang Lungsod ng San Pablo in Laguna, said that the writeshop enabled the participants to view science writing as challenging but exciting and meaningful form of communication.

For DOST-STII, the recently concluded #sciencejournoako is beyond teaching the studentjournalists the technical aspects of science writing, but also investing in the future, which is to produce influx of communicators, who will help them on a consistent basis in sharing the gospel of S &T to everyone.

# 2016 NICE WINNING INVENTORS PROVE PH IS A SCIENCE NATION

BY FRAMELIA V. ANONAS, DOST-STII

The winning inventors in the DOST-TAPI's 2016 National Invention Contest and Exhibits prove that the country is indeed a "Science Nation", as they come from various sectors and different parts of the country.

y now the inspiring story of the year's best inventor has gone around the science community and beyond, sparking hope from among the "less educated" and those who hold blue-collar jobs. Why not? The award went to Melchor L. Henosa, 36, and a jeepney driver. Even his own neighbors did not believe he could make his device work, but this downside - and the lack of capital – did not deter him to keep on working.

After five years of hard work, his device, described

as a life-saving device that automatically stops leakage of brake fluid at the first drip, clinched the top prize in the country's most prestigious invention contest. Called the "Leak Saving Valve for Brake System of Motorized Vehicles", the device earned him the Tuklas Award with P150,000 cash, certificate, plaque, and the World Intellectual Property Organization (WIPO) Gold Medal.

Meanwhile, another very practical and environmentfriendly invention called "The Green Eco-Toilet System" of



Melchor L. Henosa

Daniel A. Camacho from Quezon grabbed the first prize of the Outstanding Utility Model that came with P100,000, certificate, plaque, WIPO Gold Medal. Also called GETS, the toilet system is designed to re-use water from the sink and other sources to flush the toilet bowl. The reused water dramatically cuts water bills and also saves our water supply.

Another very practical invention with equally high potential is the Outstanding Industrial Design called "Model 3 Solar-Powered Road Marker" of Percival G. Barba of Quezon City. For bagging the top prize, Barba received P100,000, a WIPO plaque, and certificate.

Further, the Likha Award for the Outstanding Creative Research top prize went to "PhilMech Compact Cornmill"



Leak saving valve for brake system of motored vehicles



Daniel A. Camacho

The green eco-toilet system



Percival G. Barba

Solar-powered road marker

of Michael A. Gragasin, Dr. Romualdo C. Martinez, and Jayvee P. Illustrisimo, all from Nueva Ecija. The wimning team was awarded P50,000, certificate, and plaque.

College student Neil Anthony S. Jamili of the University of Mindanao in Matina, Davao City pocketed the top SIBOL Award (Student Creative Research for College) for his "Sweet Potatoes: Starch: A Degradation Catalysis Component of Biomate Added High Density Poly-Ethylene Plastics." Jamili received P50,000, a certificate, and plaque.

For the high school level, the top prize of the SIBOL Award went to Jose Carlos C.



PhilMech enginners: Michael A. Gragasin, Dr. Romualdo C. Martinez, and Jayvee P. Illustrisimo,



PhilMech Compact cornmill



Neil Anthony S. Jamili of the University of Mindanao

Biomate-Added High Density Poly-Ethylene Plastics

Paco, Red Angelo M. Hizon and Mary Emjay L. Cairo of the Colegio de San Juan de Letran in Calamba, Laguna for the invention "Aquatic Z.O (Aquatic Zero Oil Skimming Robot which won the team P50,000, a certificate, and plaque.

#### **Other winners**

The second prize in the Tuklas Award went Roderick S. Dayot for the invention "Pyroclave Non-Burn and Water-free Medical Waste Treatment Technology." The Davao City-based Dayot won P100,000, a certificate, and a plaque. Meanwhile, the "Pre-Cast Composite Block Panel with Assembly of Recycled Cylindrical Cardboard Rolls in-Fill" by Eduardo P. Urcia of Pasig City got the third prize with P50,000.

In the Utility Model category, the second prize

went to "Mineral and Oxygen-Rich Alkaline Drinking Water Purification and Sterilization Equipment" of Baguio Citybased Rodrigo P. Duque who received P50,000, a certificate, and plaque. The third prize went to Dr. Ma. Christina B. Gragasin and Aileen R. Ligisan of Nueva Ecija for their invention called "Pharmaceutical Grade Pectin From Mango Peels" which earned them P25,000, certificate, and plaque.

Placing second in the Outstanding Industrial Design was the "Theo Cocktail Table" of Vito Angelo D. of Mandaue City, Cebu which received P50,000, certificate, and plaque.

For the Likha Award (Outstanding Creative Research), second placer was the "Lamp Primers for White Spot Syndrome Virus" of Dr. Mary Beth B. Maningas of the University of Santo Tomas, Manila with a prize of P25,000, certificate, and plaque. The third prize went to Davao City-based Aezer L. Cajegas for the "Reddopac the Highly Polymerized Cationic" which came with P15,000, certificate, and plaque.

Second prize in the SIBOL Award (college) went to the invention "Obstacle Detection and Evasion System for the Visually Impaired People" of Raven S. Tabiongan from the Samar State University in Catbalogan, Samar who received the prize of P25,000, a certificate, and plaque. The third prize was given to "Design, Fabrication and Evaluation of Spiral-Paddled Type Water Wheel" of Jeremy B. Collado from the Nueva Viscaya State University in Bayombong, Nueva Vizcaya.

Collado received a cash prize of P15,000, a certificate, and plaque.

The SIBOL Award (High School) second prize was awarded to Catherine Joy N. Abella and Francis Anthony M. Homillano of the Philippine Science High School-Bicol Region Campus in Goa, Camarines, Norte. For their invention called the "Do-It-Yourself Low-Cost Gel Electrophoresis Equipment", the team received P25,000, a certificate, and plaque. Meanwhile, the third prize went to the invention called "iFlood: Improvised Flood Alarm and Warning Device" by Ronnie Lei Magno of the Regional Science High School of the Subic Bay Freeport Zone in Olongapo City. Magno received P15,000 a certificate, and plaque.

# SETUP AND ITS ADOPTORS: Growing together

BY KARL RAVEN A. RAMON, DOST-STII PHOTOS BY: DOST-REGION VIII



**BEST SETUP ADOPTORS in 2016** | (L-R) Usec. Anthony C. Sales, Asec. Asec. Urdujah A. Tejada, Benjamin Lao of LIFI , Florentino Rodil of BLMC, Troy Bumagat of Trophy Farm (National Best SETUP Adoptor of 2106), Sec. Fortunato de la Peña, Engr. Crispin Muyrong of Sunlight Food Corp., Engr. Rolando G. Rupac of AMCC, Usec Rowena Cristina L. Guevara, and Dr. Carl E. Balita of OneSTore Hub during the SETUP Forum held at the DOST-Executive Lounge on July 26. (Photo by Gerardo Palad, S&T Media Service, DOST-STII)

> "The success of the program will not be possible without your cooperation, extended by you, our SETUP adoptors."

-Dr. Urdujah A. Tejada Assistant Secretary for Countryside Development



happy and grateful batch of entrepreneurs handpicked from all over the country basked in both pride and humility for being cited as the best SETUP adoptors in 2016. SETUP or the Small Enterprise Technology Upgrading Program is the Department of Science and Technology

> (DOST) flagship program for assisting micro, small, and medium enterprises (MSMEs). Through SETUP, MSMEs are able to adopt technological innovations that improve their operation, escalating their productivity and competitiveness.

> The awarding was held during the SETUP Forum at the DOST Executive Lounge last July 26 as part of the National Science and Technology Week (2016 NSTW). Aside from recognizing the remarkable performance of said SETUP adoptors, the DOST also aims

#### JUAN SCIENCE MAIN FE

**MAIN FEATURES** 

to encourage other adoptors to perform better and nonadoptors to avail themselves of the SETUP.

Finalists for National Best SETUP Adoptor in 2016 consist of enterprises that focused on metals industry, food processing, and livestock production. The Best National SETUP Adoptor in 2016 is into broiler production.

#### Million-worth Trophy: National Best SETUP Adoptor of 2016

"I owe my success to the tremendous support extended by DOST, especially at the typical time when I needed help the most"-Mr. Troy Bumagat (Trophy Farm)



From thousands to millions, that's how Trophy Farm Supplies' owner Troy D. Bumagat, a retired military officer turned agripreneur, expanded his enterprise after his foray into broiler production and availing of DOST's support.

From a P 35,000- start-up capital in 2010, Trophy Farm



**A TROPHY FOR A TROPHY.** Troy Bumagat (left), owner of Trophy Farm Supplies, smiles proudly as he receives the "National Best SETUP Adoptor of 2016" trophy awarded by DOST Sec. Fortunato de la Peña. (Photo by Gerardo Palad, S&T Media Service, DOST-STII)43

in Kananga, Leyte became a P 40M integrated farm in just five years. Neither a day-old success nor a chicken feat, Trophy Farm is now as proud as a rooster for being recognized as the Best SETUP Adoptor of 2016 in the Visayas and eventually bagging the title "National Best SETUP Adoptor of 2016" despite being a newbie in SETUP, as it availed itself of the program in 2014.

Thru DOST-SETUP's support, Trophy Farm was able to expand its broiler capacity from 64,000 in 2014 to 140,000 in 2016. As such, the company is the biggest poultry farm in Region VIII. Aside from its broiler capacity increase, its production of bio-organic fertilizer also grew nine times higher.

Apart from equipment acquisition, Trophy Farm

also went through breeder production management trainings which led to "improving the efficiency as manifested by high production and low mortality," as Bumagat said during the forum.

In 2014, the average mortality rate of the broiler breeds was 5-6 percent. But after DOST's technical advice it leveled down to 1-2 percent only. In just one year, the integrated farm's income soared up to 179 percent and gained 277 percent increase in employment generation by creating 25 additional jobs directly involved in the project.

The growing enterprise also expanded its distribution from Ormoc to the whole of Region-VIII. "I am proud to say that my partnership with DOST contributed to ensure food security in Region VIII," said Bumagat.



Engr. Crispin & Mrs. Ma. Luz Muyrong

A brighter sunlight for this food company "SETUP, tinuruan kami tungkol sa equipment, capital, pinansyal at higit sa lahat binigay sa amin yung trainings, napakaraming trainings ng DOST. Ito yung tinatawag na techniques" -Engr. Crispin Muyrong, Sunlight Food Corp.



Sunlight Food Corporation as a manufacturer of sweet preserves is not a newcomer



when it comes to being a SETUP awardee. At the Science Festival's Stakeholders Summit of DOST-NCR, Sunlight was recognized as the best SETUP Adoptor of 2015 in NCR.

This year, the sun shone even brighter for Engr. Crispin Muyrong Jr. and Mrs. Maria Luz Muyrong, owners of the Marikina City-based company, as their company was given another recognition-- this time as BEST SETUP Adoptor of 2016 in NCR.

The Company has greatly improved since it availed of DOST-SETUP assistance in 2006 and 2009. At present Sunlight Food Corporation is continuing its sweet success as it manufactures goods for major markets like Unilever, Selecta, Gardenia, Fitrite Incorporated, Adobo Connection, Red Ribbon, Chowking and Jollibee.

From high quality sweet preserves like ube, macapuno, saging na saba, langka, nata and kaong, and strawberry, the company expanded its production to other products like ube and banana puree, ube powders, buko strings, coconut milk, frozen gata, and pinipig.

The hard work of the Muyrongs and their workers plus the support of DOST boosted the company value up to 468 percent, escalated its gross sales up to 206 percent, pushed an income increase of 181 percent, surged employment by 65 percent, and achieved a 282 percent rise in terms of volume production since from 2005 to 2015.

#### Wide field of opportunity

"From the category of small enterprise before SETUP assistance, we are now in medium size category." -Engr. Rolando G. Rupac, AMCC



The Northern Region is known for its fertile soil suitable for farming. Aside from the productive soil, equipment, machineries, and facilities also help the farmers achieve higher yield.

One of the machine fabricating enterprises that helps the northern farmers have better harvest is the Agri-Component Machineries and Construction Corporation (AMCC) situated in Cauayan, Isabela. Being a promising DOST-assisted enterprise and at the same time promoting science and technology in the farming industry, AMCC was awarded as Best SETUP Adoptor of 2016 in Northern Luzon.

AMCC began its journey to business during the early '90s in which the firm experienced having limited fabrication equipment which also resulted in limited production capacity. But this was until the company availed itself of the DOST-SETUP assistance in 2012. The said enterprise received more than P2 million worth of equipment acquisition inclusive of trainings and seminars.

Starting in 2015, AMCC was already able to offer time- and cost-efficient farm implements, dryers, furnace, and milling machines for different type of commodities.

From then, the enterprise plowed toward success. By 2015, its income increased up to 434 percent, opened additional 71 jobs, boosted production up to 81 percent, and raised its asset value 12 times higher, with its gross sales increasing by a whopping 14 times.

#### Meatier than it sounds

"Ang market naming dati palengke lang ng Bansud, ngayon mayroon na kaming 14 dealers and outlets sa Mindoro, mayroon din sa Marinduque."-Mr. Florentino Rodil, BLMC



Before Bansud Livestock Multipurpose Cooperative's (BLMC) high leap, the firm only supplied the Bansud Municipal Market in Oriental Mindoro. Now after DOST's support, BLMC has reached other provinces like Marinduque, Aklan, Cavite, and even Metro Manila.

DOST thru SETUP started assisting this meaty enterprise in 2012, granting P 750, 000 worth of equipment upgrading inclusive of trainings. Now BLMC offers tummy-fillers such as hotdog and bacon apart from their previous product lines of fresh meat, longganisa, skinless longganisa, footlong, and tocino.

Seeing a beefier future for the firm, DOST awarded BLMC as Best SETUP Adoptor of 2016 in Southern Luzon not only for sustaining the program but also for promoting science and technology in the meat processing industry.

From 2011-2015, the asset value of BLMC stretched to 104 percent, and its fresh meat production rose five times higher: its tocino products

increased seven times, its skinless longganisa rose thrice as much, and its footlong hotdog went up three times. As well, increase in asset value and production were reflected in their net income.

With the firm's dramatic growth, more locals are joining this multi-purpose cooperative. From 317 active members in 2012, membership has beefed up to 596 in 2015. BLMC also shares opportunity to the locality as it generated additional five jobs to people who are directly involved in the project.

#### LIFI's better with coconut

"I am not curious about who will win as overall best SETUP adoptor... The fact that we are here today, adoptors sa ating program ng DOST sa SETUP, tayo po right now ay winners. Hindi alam siguro ng aking mga kababayan na kayo (DOST) ay nagbigay ng magandang buhay hindi lang sa amin kundi sa mga tao na aking kasama sa aking negosyo." -Mr.Benjamin Lao



LIFI or the Lao Integrated Farm Inc. in 2008 was just a goat project under the coconut trees located in Bansalan, Davao del Sur. But this was until the owner Benjamin R. Lao took advantage of these coconut trees in 2009 by turning this type of palm into something sweeter.

LIFI is a two-time SETUP adoptor. Its first project was an expansion of coco sugar and syrup production where LIFI was granted consultancies on Manufacturing Productivity Extension (MPEX), training on Good Manufacturing Practices, packaging and labeling execution, energy audit, and process improvement of cocobased product worth P 660,000 both funded and facilitated by DOST from 2011 to 2014.

Since then, LIFI's production of coconut sugar increased by 162 percent. Lao sees a more delightful future for LIFI so he availed himself a second SETUP-assisted project, this time to help him augment his new project by upgrading the facilities for other coconutbased products.

The implementation of the second project started in February 2016 and will end in February 2020. At present LIFI goes beyond coco sugar and syrup as the company now offers other coconut-based products like coconut teriyaki sauce, all dip seasoning and coconut sugar-based healthy teas with lemon grass, ginger, moringa and turmeric, and hot chocolate.

At present, because of Lao's tough grind and the DOST-SETUP's efforts, LIFI is now a certified FDA (Food and Drugs Administration)-licensed manufacturer and exporter of coco sugar and syrup, serving both local and international markets including USA, Canada, Australia, Germany, New Zealand, and Korea. It is now making its way to France.

With its more efficient production and a growing market, the company was able to increase its gross sales 500 times and income by 24 times, all from 2008-2015. LIFI provided additional 444 jobs, employing Davao locals as the owner's means of payback to his hometown.

As an act of caring for the environment and concern for its employees, LIFI promises to integrate organic farming as an advocacy for healthy living. This advocacy stemmed from the owner's experience of being hospitalized during his younger years due to overexposure to chemicals when he was still applying inorganic or chemical pesticide in his father's rice field.

#### SETUP, a success!

"Additional employment na nandoon sa region, hindi na kailangang umalis para lang maghanap ng trabaho. Malaking bagay ang hindi mahiwalay sa inyong pamilya" [pertaining to the the 146, 728 job opportunities generated by SETUP] - DOST Secretary Fortunato de la Peña

The 14-year old flagship program of DOST continues its mission of assisting MSMEs and immediately addressing the needs of entrepreneurs in availing appropriate technologies.

Despite the program's young age, SETUP which only had two adoptors in 2002, has already assisted 26, 673 MSMEs in its 14 years run. A total of P 2.546 billion of SETUP investment support has already been granted and some 45,462 technological interventions had been facilitated, creating a domino effect as it opened 146, 728 job opportunities.

It is not only the SETUP adoptors who grew each year but also the program itself. The success of SETUP adoptors is also the success of the program. SETUP and its beneficiaries – they are indeed growing together.





DEPARTMENT OF SCIENCE AND TECHNOLOGY

DOST-V and PSTCs. Dir. Tomas B. Briñas at the middle (raised hand) led the celebration of RSTW in Bicolandia.

# YOU CAN FEEL IT A SIZZLING S&T WEEK IN BICOL

BY ANGELINE ZUMODIO, DOMINGO PEÑA, AND JIMBOY ARMARIO, DOST-V MAURICE COMIA AND PAOLA VELASCO, PSTC-CAMSUR KARL RAVEN A. RAMON, DOST-STII Photos by DOST Region V

#### The Regional Science and Technology Week spiced up Bicolanos with a sizzling array of S&T activities in a fully-packed program.

arallel with DOST's tagline '**Agham na Ramdam**', Bicolanos indeed felt S&T in their region as DOST-V led by Regional Director Tomas B. Briñas held the Regional Science and Technology Week (RSTW) on July 25-27, 2016 at the La Piazza Hotel and Convention Center, Legazpi City in Albay.

This year's national theme is "Juan Science, Juan Nation" bespeaks DOST's goal which is to spark interest in every Juan on S&T not only in the metros but also in the regions.

As part of the RTSW, DOST-V conducted fora/ symposia on technology transfer, Disaster Risk Reduction Management and Climate Change Adoption (DRRM/CCA), and Health and Food Safety. An exhibit on different DOST-led programs and projects was also conducted. Some of the highlights are the signing of a Memorandum of Agreement (MOA) and Fund Turn-Over between DOST and new SETUP adoptors and a showcase of DOST technologies for adoption and commercialization.

#### Technology Transfer Day

DOST-V showcased locally developed technologies which are market-ready in the firstever Technology Transfer Day in Bicol held on July 26, 2016. Dir. Briñas opened the event by imparting to guests and participants that the gathering aims to turn the spotlight on new technologies which are ready for adoption and commercialization.

One of the featured technologies was the Stabilized Brown Rice presented by Food and Nutrition Research Institute's Engr. Rosemarie G. Garcia who pointed out the health problems that Filipinos face particularly the prevalence of micronutrient deficiencies. The brown rice technology aims to efface anemia as stabilized brown rice contains vitamins and minerals. It also has dietary fibers that can fight obesity, and has low to medium glycemic index which is good for those who have diabetes.

At the end of the Technology Transfer Day, Pecuria Development Cooperative Inc. of Camarines Sur and Boyet Rice Mill of Camarines Norte became potential licensees for the stabilized brown rice technology.

Another featured technology was the Industrial Technology Development Institute's Natural Sweetener from Nipa Sap. Charito M. Villaluz of ITDI's Food Processing Division developed a new method for the production of alternative sugar from nipa sap. Ms. Villaluz explained that this alternative sugar is easier to digest, elevates mood without some of the disadvantages of sucrose, regulates blood sugar level, and boosts the immune system.

Meanwhile production of Emergency Food Reserve

#### (EFR): Government-Private Cooperation for Community Disaster Preparedness SAGIP, another ITDI technology, was presented by Mr. Charles Feb O. Palla.

Palla underscored the impact and importance of local food aid production, stressing that local food aid production cost is lower than shipping food aid from international donors and provides timelier assistance. EFR is an energy food in powder form that is made from cassava, malunggay, camote, and monggo which are cheap, locally-available, effective, and safe. This EFR can serve as food extender to cookies, chicken soup powder, baked pulvoron, chocolate drink and bars, and butter cakes.

EFR processing facilities have been set up in a number of disaster-prone areas like Botolan, Zambales which has a community-based facility since 2011. "Let hungry communities achieve food security on their own," said Palla to close his talk.

Engr. Jude L. Sasing introduced the Axis Knee System as an affordable and innovative total knee replacement. It is designed by an international team of surgeons and engineers headed by Dr. Ramon Gustillo through Orthopedic International Inc. and with the support of DOST's Philippine Council for Health and Research Development.

Axis Knee System serves as a promising technology to those who suffer from osteoarthritis as it has already benefited more than 70 patients. Trainings for surgeons are currently being conducted so they can bring this technology to the regions. On its recovery period, "Some patients were able to walk as soon as Day 1 after the surgery," said Engr. Sasing.

Other featured technologies were the Cacao Seeds Processor



Math teachers training

invented by Joshua C. Collao, a fifth year student of Camarines Sur Polytechnic College, and the Twining/Twisting Machine of the DOST- Philippine Textile Research Institute. This machine can produce yarns from indigenous fibers, according to Ramiro L. Guab.

The last three technologies featured, One Expert, OneSTore, and OneLab are DOST's efforts to improve access and streamline the provision of certain services it offers. One Expert is a web-based pool of S&T experts intended to provide technical advice and consultancy services to Filipinos anywhere in the country.

OneSTore on the other hand, is an E-commerce web application that helps DOSTassisted MSMEs widen their market scope by offering their



Science teachers training

products in the platform.

Lastly, OneLab is an ITbased project that broadens public access to testing services of all DOST laboratories.

#### Bicol's newest breed of SETUP adoptors

DOST's flagship program called SETUP or the Small Enterprise Technology Upgrading Program aims to help micro, small, and medium enterprises (MSMEs) improve their business operation. So in the very first day of Bicol's RSTW, entrepreneurs-cooperators and DOST already inked a MOA signaling the start of the Department's technical assistance to 26 MSMEs consisting of enterprises involved in food processing, metals and engineering, furniture, GDH (gift, decor

#### **MAIN FEATURES**

and housewares ), ICT, and aquaculture.

Meanwhile, 13 MSMEs received innovative system support worth P6M in total.

DOST aims to continue what it started in Bicol as it already assisted 38 firms and facilitated 44 types of technological interventions to MSMEs in their region.

#### More community empowerment projects and trainings on Green Light

Two MOAs for two projects under Community Empowerment thru Science and Technology program of DOST were signed also during RSTW's first day. The said program will benefit the Danao Women's Handicraft Organization which ventures in handicraft making using bukad and other locally available raw materials in the communities of Masbate.

Morover, the Bayanihan Savings Replication Organization, a people's organization in the municipality of Del Gallego, Camarines Sur is the recipient and cooperator of the "Bangus Processing Facility" establishment, a convergent project of Department of Agrarian Reform, Department of Social Welfare and Development, and



Regional Director of DOST-V, Mr. Tomas B. Briñas and the DOST-Scholars



PAGASA & PHIVOLCS also during the DOST-V Regional Science and Technology Week.

the local government of Del Gallego. This project aims to proliferate CamSur's One Town One Product which is bangus (milkfish).

Meanwhile, community empowerment took the form of educating people to widen S&T's reach. A week before RSTW, DOST-V held trainings at the PSHS-BRC, Goa, Camarines Sur for 62 science and math teachers.

## A Day for Future Arms of S&T

DOST scholars can be considered our youngest ambassadors of S&T. DOST paves the way from their first step in scientific journey in school up to their future careers. DOST-V's celebration of Scholar's Day during RSTW gave special focus to graduating DOST-Bicolano scholars. The activity provided learning opportunity on the set of employability skills and behaviors that are necessary to land a job in their chosen field

The Scholar's Day was attended by 180 DOST-

Bicolano Scholars together with their university scholarship coordinators from various State Universities and Colleges and Higher Education Institutes.

Competent resource persons namely Prof. Romina Villamor of Aquinas University of Legazpi, Dr. Agnes Cabredo-Marmol of Cabredo Speech Clinic, and Engr. Domingo A. Peña Jr. of DOST-V gave technical and comprehensive lectures on resume writing, communication skills, career talk, and 2016 Scholarship Updates respectively.

Apart from the lecture, the induction of officers from various school-based DOST scholars became the afternoon highlights of the event. The mass-oath taking was led by Dir. Briñas who iterated the role of scholars as a positive role model, leader, and voice in promoting science consciousness. He also gave ideas on how scholars can contribute to the improvement of science education. A disaster-ready Bicol DOST gave much efforts in helping lower disaster-related

casualties, injuries, and damage ..

One of the disasterpreparedness projects is Project NOAH or the Nationwide Operational Assessment of Hazards, and Bicol was one of the lucky regions that received orientation-training on Project NOAH during the first day of RSTW. It was participated by 80 Disaster **Risk Reduction Management** representatives from LGUs and 20 representatives from government agencies consisting of PHIVOLCS, PAGASA, Bicol University College of Agriculture and Forestry, Environment Disaster Management and Emergency response Office, and Commission on Higher Education.

Jeric M. dela Rosa of the Office of Civil Defense V, Agustin B. Serrano Jr, Senior Research Specialist, and Engr. Dan Dominic A. Triumfante, Science Research Specialist of DOST-V gave comprehensive lectures on the key components of Project NOAH such as overview of R.A. 10121, use of hazard assessment tools, system flow of installed Early Warning System (EWS) stations, and conducting regular monitoring, maintenance and troubleshooting.

Meanwhile on the last day of RSTW, DOST-V in partnership with PAGASA and PHIVOLCS organized a forum on Disaster Risk Reduction Management and Climate Change Adoption for no ordinary audience. The forum was designed for children with disability. The orientation-training was attended by 22 students and 14 teachers from different Special Education Schools in the region.

Ms. Lani D. Atutubo, SPED teacher at Rawis Elementary School, Legaspi City served as the interpreter since the orientation-training was mostly attended by students who have hearing disabilities.

#### **Bicol consortia**

While PCAARRD, PCHRD and PCIEERD were busy in the NSTW, Bicol's versions of these, BCAARRD, BCHRD, and BCIEERD, were also at work in Region V's RSTW.

Doing the same purpose as their national counterpart, conducting forum in Agriculture and Aquatic Resources, forum on Health and Food Safety and forum on Emerging Technologies from July 25-27 of RSTW respectively, all held in La Piazza Hotel and Convention Center, Legazpi City, Albay.

This year's celebration of Science and Technology Week with its programs clustered into regions resulted in more people reached, more people inspired, more people to make dreams, and more people to use S&T to turn their dreams into reality.

# Breaking the myth of the Incredible Hulk

# WHAT GAMMA RAYS ACTUALLY DO

BY RODOLFO P. DE GUZMAN, DOST-STII

Exposure to nuclear technology opened the eyes of this senior S&T writer on the actual and practical benefits of radiation to people beyond the reach of Incredible Hulk. am a great fan of Marvel action heroes and when I was much younger I never failed to watch the series on the Incredible Hulk. It was about an experiment gone wild where Dr. Bruce Banner, the lead character, got exposed to gamma radiation and turns into a green-skinned monster with super human strength every time he gets agitated – a mutant human being.

Was it bad? Maybe, but this gentle giant has become a superhero as he fought the evil around him using his superhuman strength and agility. But at the same time he struggled to control his anger.

The Incredible Hulk was my hero and he was the closest I got with my first-hand experience with the science of radiation.

But this is cinematic magic. In real life this isn't so. Better yet, radiation has its many benefits to humans and we experience this day in and day out, without us even noticing it because it has been part of our lives all along.

# Nuclear and radiation technology

For years, nuclear and radiation technology have paved the way for advancements in the field of agriculture, healthcare, industry, environment, energy generation, disaster mitigation and in our way of life.

In the country, the lead advocate of nuclear technology is the Philippine Nuclear Research Institute (PNRI) of the Department of Science and Technology (DOST). PNRI is an agency created by the Science Act of 1958, initially known as the Philippine Atomic Energy Commission or PAEC that was tasked to undertake and oversee



Medical experts visit the hot cell of the Technetium-99m Generator Facility

research and development programs and promote initiatives of government on radiation and nuclear technology and to establish regulations to protect the health and safety of radiation workers and the public.

PNRI has been at the forefront of local researches on radiation as a way to improve our lives. For many years now, our Filipino scientists had made significant headways in the field of nuclear and radiation technology, bannering innovations that led to the development of high-yielding crop varieties and novel biomedical products, improvement in soil and water management, production of long lasting and safe food products and protection of the environment.

#### Breaking the myth

PNRI is one agency that helps break the myth that radiation is always harmful to man. With extensive research in the field of nuclear science and radiation technology, the agency has developed many beneficial uses of radiation, particularly to improve agricultural productivity.

Recently, PNRI together with DOST's Philippine Council for Agriculture Aquatic and Natural Resources Research and Development or PCAARRD has developed a plant food supplement (PFS) using irradiated carrageenan (seaweed).

# Improving agricultural products

Through radiation, the simple seaweed is converted into a potent substance that boosts



A researcher from PNRI conducts gamma ray column scanning during a training course at a petrochemical plant



rice yield. The field testing of this plant in ricefields in Bulacan, Laguna and Nueva Ecija showed that a certain amount of irradiated carrageenan mixed with chemical fertilizer resulted in a 65.4 percent increase in grain weight and increase in panicle length from 3.5 to 12.5 percent.

Because of this initial success, the carrageenan PFS will be used for other crops like beans, corn, tomato, and other vegetables.

To produce the PFS, the PNRI used gamma rays from the Cobalt-60 Multipurpose Irradiation Facility, and, more recently, electrons from the Electron Beam Irradiation Facility.

The Cobalt-60 facility is the only gamma irradiation facility in the Philippines, while the electron beam facility is the first multipurpose e-beam irradiation facility.

Also through radiation, plant seed varieties are improved and are made more disease tolerant. The technology also helps in controlling insect population



PNRI-developed irradiated wound dressings such as the Skin Up<sup>™</sup> PVP Carrageenan Hydrogel (left) and the Honey Alginate Wound Dressing (right).

especially those that threaten agricultural crops, such as the quarantine treatment of Philippine Super mangoes against mango pulp weevil.

In food production, radiation is used to extend the shelf life of fresh fruits, grains, bulbs (onion and garlic), and herbs and spices without altering its state, color and other physical appearance, while keeping it safe and fit for human consumption.

## Industry and energy application

Radiation has been proven to spark industrial activities by improving processes in producing different high quality products. Gamma rays are used for scanning the columns of petrochemical plants. Similar to x-rays for the body, gamma rays can reveal any damage inside the column without interrupting the operations, saving time and other expenses.

Nuclear gauges are also used to measure the thickness of various products, such as plastics and papers.

On a bigger picture, nuclear technology is responsible for generating electricity and power in many industrialized countries like the United States, France, Japan, China, and Russia. As a result of this, power consumption using fossil fuel is minimized and cost of electricity is maintained at a lower rate. As of July 2016, there are a total of 444 operable grid-electric nuclear power reactors in the world.

# Healthcare and patient management

Beyond the well-known applications of X-rays in medicine, radiation is also used to sterilize medical devices and products like bandages, hypodermic syringes and surgical instruments, sutures, orthopedic implants, bone grafts, among others. This ensures quality healthcare for the public.

Radiation, like in Cobalt-60 treatment, is still being used to destroy cancer cells and reduce size of tumors. The radioactive iodine (Iodine 131),

The rice fields sprayed with radiationprocessed plant food supplement (left) proved much more resilient to lodging compared to the rice fields without PFS (right)



on the other hand, is applied to diagnose and treat thyroid cancer.

Through radiation technology, the PNRI has developed wound dressings such as the Polyvinyl Pyrrolidone (PVP) Carrageenan hydrogel dressing and the honey wound dressing. The PVP hydrogel dressing, with the brand name Skin Up, is a cheap alternative to more expensive counterparts. The honey wound dressing is made from local honey sources. Both dressings are also effective in treating burns and bedsores.

Then there is the Technetium-99m Generator facility at the PNRI's Radioisotope Laboratory. With this facility, the requirements of nuclear medicine centers and hospitals for Tc-99m can be supplied locally instead of importing this abroad, resulting to lower cost. Radiopharmaceuticals such as Technetium-99m are used to diagnose and treat various diseases. The DOST-PNRI is undertaking the development of the Sterile Insect Technique for Dengue Mosquito Vector (*Aedes aegypti*) using gamma irradiation. This research work on pest suppression

#### **Environment protection**

Nuclear techniques are being used to protect the environment. Although there were isolated nuclear accidents in the past like the 2011 Fukushima Daichii Nuclear Power Plant accident, nuclear technology has contributed much to environment protection.

The use of nuclear and isotopic techniques are being implemented in tracing pollutants in Manila Bay and in Boracay, as well as in identifying sources of pollution and in estimating the composition of air particulates in Metro Manila. The electron beam technology, on the other hand, can be used for wastewater treatment.

Moreover, the Environmental Radiation

Monitoring System (EFRD-3300) provides continuous and real-time monitoring of ambient gamma radiation, an early warning system to monitor radioactive emergencies like the Fukushima incident. There are two other stations in Cagayan and Palawan, plus two more upcoming in Cebu and Davao.

These stations will measure ambient radiation levels in the environment every five minutes for 24 hours daily, thus allowing the government to respond and take timely actions in cases of emergencies to ensure public safety.

PNRI also continues to provide constant radiation monitoring through the management of the Comprehensive Nuclear Test Ban Treaty Organization Monitoring Stations. Under its program, the PNRI currently operates the Radionuclide Monitoring Station (RN-52) located in Tanay, Rizal and the National Data Center (NDC-137), at the PNRI grounds in Quezon City.

So, who would say that radiation is all bad?

These are just a few of a long shopping list of the many beneficial uses of radiation technology that has through the years created more opportunities for growth and development. With the Philippine Nuclear Research Institute around to properly monitor, regulate and manage these resources, we are assured we are safe from radiation – and we will definitely not turn green when exposed to of gamma rays!



A specialist from PNRI prepares the EFRD-3300 Environmental Radiation Monitoring System for real-time online monitoring of radioactivity in the environment

# METRO MANILA SCIENCE COMMUNITY A NOURISHING DOSE OF HEALTH TECHNOLOGIES AND SERVICES

BY ALEXANDRIA DENNISE S. SAN JUAN, DOST-STI





Open House Exhibit featuring DOST's breakthrough projects, technologies, and services in healthcare during the second day of the celebration of the 2016 National Science and Technology Week at the Metro Manila Health Science Community held at SM Mall of Asia South Pavilion in Pasay City.



he Philippine Council for Health Research and Development (PCHRD), in partnership with the Food and Nutrition Research Institute (FNRI) and the Metro Manila Health Research and Development Consortium (MMHRDC) celebrated the week-long event with the theme "Kalusugan ni Juan at Juana, Kalusugan ng Bayan".

As part of the celebration, DOST's breakthrough projects, technologies, and services in healthcare were featured within the Metro Manila Health Science Community through an Open House Exhibit. Highlights include the RxBox, Biotek-M, Axis Knee System, and eHatid, among others.

During the second day of the event a forum about natural products and nutrition survey were held in the morning and the afternoon respectively attended by students from different schools and institutions.

The forum entitled "Lunas para kay Juan at Juana, Handog ng Likas-Yaman ng Pilipinas" was presented by different scientists who discussed about natural products.



Forum attendees had a full-packed day with loads of activities.

Dr. Renato Reves from Central Luzon State University talked about Mushroom Pharming in Central Luzon; Dr. Reggie Dela Cruz from Central Mindanao University tackled Drug Discovery and DNA Barcoding in Philippine Ferns and Lycopods; Dr. Gisela Concepcion from the Univeristy of the Philippines-Diliman and this year's recipient of the Outstanding Science Administrator Award confer Biodiversity and Drug Discovery Research on Marine Organisms from the Philippines; Dr. Edgardo Tulin of the Visayas State University discussed the multiple health benefits of root crops; and Dr. Mafel Ysrael discussed the proper usage of medicinal plants.

Meanwhile, in the afternoon session, a forum about nutrition survey was held wherein issues regarding nutrition in the country were discussed by the FNRI such as The Double Burden of Malnutrition, Status of Maternal Health and Nutrition and Infant and Young Child Feeding Practices in the Philippines, The 2015 Food Consumption among Filipino Households, Emerging Nutrition Concerns, and The Philippine Food and Nutrition Landscape.

Aside from the exhibit and the forums conducted, the community also held activities such as Health Webinar, Traditional Medicine Forum, Forum on Road Injuries, Forum on Nutrigenomics, Biobank and Lay Forum on Cancers, Trailblazers in Science: National Scientists Lecture Series, BioCamp, Best Research Paper Oral Presentations, and symposiums.

Some universities in Metro Manila also participated in by conducting activities presenting current issues and concerns on health in the country such as the University of Sto. Tomas, De La Salle University, University of the East-Ramon Magsaysay Memorial Medical Center, University of the Philippines-Manila, and St. Luke's Medical Center.



# **SETUP** hikes to Bukidnon

BY RITCHIE MAE L. GUNO, DOST- REGION X

A HIGHLAND province in the Northern Mindanao region, Bukidnon boasts of many assets. First of all, it is home to the country's fourth highest peak, Mt. Kitanglad. Towering at 2,899 meters, Mt. Kitanglad is also an Association of Southeast Asian Nations Heritage Park.

As the Food Basket of Mindanao, Bukidnon is also a major producer of agricultural products

including sugar and pineapple. In fact, the province houses the world's biggest pineapple plantation.

The Small Enterprise Technology Upgrading Program or (SETUP) of the Department of Science and Technology (DOST) has touched this paradise in the heart of Mindanao, thru its very own resources which have helped prop up the image and economy of the province. Certainly, SETUP has further injected Bukidnon with more beauty and prosperity – via science and technology that have helped promote productivity and business success among its locals and the MSMEs.

Below are stories of three of these small enterprises which have benefited from SETUP. On the wayside, not only did the business owners reap the fruits; but so did their employees, workers, and communities.

#### Local technology works: An innovation through essential oil processing

ocal technology works in farming and essential oil processing at the foothills of Mt. Kitanglad, home of the Bukidnon indigenous people.

Ben and Jean Maputi of Imbayao, Malaybalay City, view farming as a way of life. For them, having a large farm is not about earning more; instead, they believe that even small family-run farms can also produce more and remain viable. It is about a genuine determination to produce, process, and add more value to crops and generate more income. For the Maputis, this has become a lifestyle.

"Being a farmer means being innovative. One day, an innovation came across my mind... why not extract essential oil out of citronella plants? This was an alternative upland livelihood for the upland farmer like me using the simple technical operation of a wood fired



Citronella



Distillation still for leaf-oil extraction provided by DOST

extraction," said Ben. Then DOST came and offered a technology."

DOST or the Department of Science and Technology provided the first distillation still for leaf oil extraction to the community. And Malaybalay City provided a new distillation still designed for farm level processing/extraction of essential oil with a capacity of 500 kilos of citronella plant. Essential oil farming became a community enterprise that has benefited 15 households. From this, families' incomes have increased tremendously and their children have gone to school and finished college, allowing the communities to experience better standards of living.

Today, Mt. Kitanglad's essential oil producers are partners of Human Nature

#### ENTERPRISE

Natural Products, the first producer of affordable and genuinely natural products in the Philippines.

Leading the community with his wife, Ben has played a vital part in transforming the ancient essential oil tradition into the modern way of living - making wellness possible to millions of Human Nature products users.

The next time you get hold of a Human Nature product, bear in mind these two things: One, that you have in your hand the pure essential oils of Mt. Kitanglad. And two, that you have at your fingertips the product of local technology working in the lives of indigenous peoples.



#### The science behind CAKEBOOM: Bukidnon's best delicacy producer





Cakeboom products on display

R Malaybalay City were employees of one of the large firms in Bukidnon which are into production or processing of agricultural products.

Later, they left the firm to start their own business. They started as sidewalk vendors of Filipino delicacies and cakes and distributed their products to some food outlets.

The couple got their break when they won the Malaybalay City Best Delicacy contest in 2008 for their piñasitas, a pastry with pineapple filling. The product won again in the province-wide contest, as Bukidnon Best Delicacy in 2008. Through local and regional fairs, piñasitas gained fame in other parts of the Philippines as well. Now, Filipinos going abroad buy the delicacy as a "pasalubong."

As their company, Cakeboom and Party Flavor, grew, the Lims' business objective shifted from simple livelihood to helping their workers sustain their source of income and employment. Thus, in 2009, Cakeboom developed a new line of healthy pasalubong products that would meet consumer demand for healthy and nutritious foods. The product is called piñakasi - coined from "piña" which is the Visayan term for pineapple, and "kasi" which is the acronym for kalamunggay-squash.

With their growing recognition, piñasitas and piñakasi saw a continually increasing consumer demand. However, Cakeboom and Party Flavors could provide only a limited volume of these products to some customers.

To cope with the huge demand and at the same time maintain product quality, the couple sought DOST's intervention in 2012 via its Small Enterprise Technology Upgrading Program or SETUP. Under this program,



#### ENTERPRISE

upgrading of production equipment such as cooker mixers and continuous band sealer for packaging, was undertaken. Food safety handling protocol training for the staff was also conducted.

Before SETUP's assistance, Cakeboom operated with manual processing using mostly non-food grade equipment. With SETUP, the company now produces quality, competitive, affordable, and healthy "pineapple-based pasalubong" products. It has increased sales by 85%, from P 8.2M to 15.3M and increased productivity by 52%, from 154,278 boxes to 234,616 boxes.

"We are very thankful [for] the assistance shared by DOST through the Provincial S&T Center in Bukidnon. We [have] become very efficient in producing quality products highlighting our very own product which is pineapple," said Mrs. Lim.

Cakeboom, now with three outlets in Malaybalay City, continues to establish a name in the food processing industry, bringing pride to Bukidnon.

#### Valencia Muscovado Sugar Mill: alternative facility for the sugar farm

Diversification, technology and innovation: these are three important things the Prantilla family considered when they got their start in muscovado sugar processing.

While most sugar farmers are content with producing centrifugal sugar, Prantilla decided to pioneer in the establishment of a muscovado processing facility in Bukidnon. Thus in 2008, through the technical assistance of local consultants, Engr. Elias B. Prantilla built Valencia Muscovado Sugar Mill in Brgy Lorugan, Valencia, Bukidnon.

At first, the farm's sugarcane deteriorated because of the extended waiting time for the mill at the traditional sugar centrals, thus causing Valencia Muscovado Sugar Mill to experience losses. When the facility was tested, it failed to produce the desired quality of muscovado.



Sugarcane bagasse, a fiber waste after juice extraction used as biofuel



Muscovado sugar, product of Valencia Muscovado Sugar Mill

Succeeding attempts ended in dismal failure. In January 2011, the proponent requested assistance from the Department of Science and Technology (DOST) for a technical evaluation of his production facility.

Results of the technical evaluation conducted by DOST's Metals Industry Research and Development Center (MIRDC) found inherent flaws in the equipment design, which was principally responsible for its failure to produce the desired product.

With the DOST intervention using an MIRDC developed process successfully proven in various muscovado processing plants in Iloilo City, it was hoped that the facility would finally be able to process export quality muscovado sugar.

On January 26, 2012, DOST confirmed the approval of Valencia Muscovado Sugar Mill's request for the DOST's Small Enterprise Technology Upgrading Program (SETUP) technology package asssistance. Under SETUP, the company was able to upgrade its equipment



Muscovado processing plant designed by DOST MIRDC-Iloilo City

by adopting the DOST generated muscovado processing technology.

The owners and workers were trained on GMP and other food safety standards, product enhancement and nutritional analysis. The resulting upgrade in product quality from Class C (wood brown) to Class A (golden brown) increased sales by 250% - from P 400,500 to P1M - barely one year after the SETUP assistance was made available.

In addition, the sugar mill was able to provide employment to 20 additional production and farm workers.

Aside from helping to alleviate poverty in the locality, Valencia Muscovado Sugar Mill is also realizing its dream of developing healthy individuals as well as corporate consumers of the muscovado sugar. And it's all because of SETUP.

#### Organic farm made even better by S&T

N icasio F. Engallado is a rice farmer and advocate of ecologically sound farming in Tongantongan, Valencia City, Bukidnon. He and wife Fatima started Engallado's Nature Farm and Natural Food Products in August 1997. The company focuses on the production of organic rice and its by-products.

To improve operations and product quality, the couple attended various seminars and forums. Among these is a series of intensive trainings on Sustainable Agriculture conducted by the Sustainable Agriculture Center of Xavier University, College of Agriculture, Xavier University-Ateneo de Cagayan.

With everything they have learned, it became the couple's dream that their products will be able to compete with other pasalubong products, to be efficient in their operation, and be part of the food processing industry. Indeed, their natural food products have slowly gained recognition from health conscious consumers. Their barquirice, in particular, has been awarded as Best Delicacy during various food fair contests in Malaybalay and Valencia. Recently, the Department of Agriculture also awarded Mr. Engallado as the National Organic Rice Achiever.

He recalled that it used to take them one day to manually process one product with a volume of only 45 packs or six pieces per pack.

Until DOST came to their lives. Engallado sought DOST's assistance through its Small Enterprise Technology Upgrading Program (SETUP). The interventions included provision of food grade equipment, process improvement, and provision of packaging and labeling program (product development).

With SETUP, the company was able to add new product lines aside from barquillos, rice quiron (pulvorice) and rice buttons (cookies). The new additions are cuacoy (steamed rice), roasted rice (sara-sara), merengue and piaya.

With the shift from manual to semimechanization, the company has increased its production per day from 45 packs to 150 packs of barquirice, from 96 packs to 200 packs of pulvorice, and from 30 packs to 80 packs of sarasara. Its product sales rose from P262,430.00 to a high of P1.5M after the intervention.

Aside from their dream of churning out quality, competitive products, the Engallados likewise dream of having their customers to buy not just the items they sell, but the benefits of organic products as well. In essence, they envision their customers to be drawn to these products because of the benefits they offer.

With DOST's technology innovation and the company's hard work through SETUP's intervention, this dream is becoming a reality for Engallado's Nature Farm and Natural Food Products.





## Technology helps this 77-year-old bakery rise again

BY GERALDINE BULAON-DUCUSIN, DOST-STII

WHEN THE Department of Science and Technology approached him to offer assistance to modernize his 77-year-old Kamuning Bakery and Cafe, Wilson Lee Flores, businessman, college-teacher, writer, and history enthusiast, initially declined. He had low expectation when it comes to government service.

"Ang impression ko, mahirap ka deal ang gobyerno. Huwag na lang. Sakit ng ulo, maraming busisi. Parang allergic tayo (My impression is that it is hard to deal with the government. Don't bother. It will be just a headache, there are too much requirements. We're allergic)," he recounted his usual impression.

But when the National Capital Region office of the Department of Science and Technology (DOST-NCR) persistently convinced Flores that his bakery business is in need of a technology boost, he finally relented.

#### The takeover of Kamuning Bakery

The intervention was a result of a chance encounter with one of the children of the original owners of Kamuning Bakery, Atty. Leticia Bonifacio Javier and her husband Marcelo Javier, Sr. during Flores' business conference at the Asian Institute of Management. People from the audience approached him, knowing he's a real estate broker and they asked him to sell their properties like apartments and condominiums. There was one guy who approached him wanting to sell off the property of his parents in Kamuning. Flores said, he knows of an old bakery there, which he frequented in his college years. It turned out to be just the property that the son was talking about.

Since the bakery has been neglected, with the owner coming over just once a month, and few breads produced, the family

decided to sell everything. Prior to selling, the property was partitioned into dental clinic, printing press, carinderia, and the area upstairs became a boarding house to students, families, and employees.

Instead of selling off the property to others which might just tear the whole place down including the bakery, Flores decided to buy the piece of property himself. One of the requests of the owner is for him to retain the bakery as a legacy of his parents.

His love of good food and history prompted him to buy the property. Kamuning Bakery used to be the only bakery in the neighborhood in 1939, but that changed when baking technologies were introduced in the 1950s, making it easy for anyone to put up a bakery. The onset of technology has affected the Kamuning Bakery because Kamuning



Preparing the bakery's famous products

produced its bread using pugon (traditional wood-fired oven).

The pugon-style baking is much difficult compared with more modern bakeries because it is more labor-intensive and requires more workers. Sourcing of firewood is also another challenge. Further, production is low despite a long work process. Because of this, hardly anybody gets into the pugonbaking business, anymore except, perhaps, in the provinces where old style baking still lives.

Despite these drawbacks, Flores opted to retain and revive the pugon-style baking because that is exactly what makes his business unique. Kamuning Bakery is one of the few remaining authentic pugon-style baking business in the country. Originally, Kamuning had two working pugons which could roast 24 lechons each simultaneously. Currently, only one is in use as the other one is being repaired.

#### **Government intervention**

Support from the government came at the right time. The bakery only had two bakers and at the time there was a great demand for their bread. The bakers hardly had time to rest, they slept late and got up early until they all got sick at the same time.

When Flores finally availed himself of the support of the Department of Science

and Technology, he was pleasantly surprised of the magnitude of support, as well as in the manner that DOST delivered its services. "Nagulat ako. Hindi lang yung tulong sa baking. Ang galing nila (I was surprised not only for the support for baking-- they're good.)," he said.

What surprised him is that DOST helped not only in baking, but with other areas of the business as well, such as food packaging, improving hygiene, practicing food safety, and others.

"They (DOST) gave us advice and assistance even on things we don't ask about. Kaya magaling sila. And they're very friendly. Amazed ako. They're really, very surprisingly good," Flores happily recounted his encounter with the team from the DOST-NCR.

Before the DOST-NCR assistance, Kamuning Bakery had about five personnel, but now they have over a dozen workers in the bakery.

Through the DOST-NCR's Small Enterprise Technology Upgrading Program (SETUP) which helps SMEs utilize and adopt technological innovations and scientific processes to improve business efficiency and productivity, Kamuning Bakery obtained a loan enabling them to acquire these technologies that boost their production and improve their operations, namely spiral mixer, planetary mixer, roller machine (sheeter), proofer, bread slicer, and three-deck gas oven.

Flores thinks that Kamuning Bakery and DOST are a percfect match because they both aim to be viable in the 21st century. The only way for small businesses like his, according to him, to be viable is through the use of technology.

"Kasi ang misconception ng mga small businesses, only the big companies use technology. Ang idea ng tao, pag small business ka, mano-mano lahat, crude lang, paramihan ng tao. Akala natin mga mayayaman at malalaking kumpanya lang ang kailangan ng technology. Eh malaki na nga sila eh. May economies of scale na sila. Itong maliliit ang kailangan ang technology to cope. Kaya ang maganda sa DOST, yung tulong nila helps level the playing field for small companies in the Philippines," Flores said.

(The small businesses have this misconception that only big businesses use technology. People think that small businesses do everything by hand, do thiings crudely, and need more people. It is assumed that only rich and big companies need technology. But they're already big. They already have economies of scale. The small ones are the ones that need technology to cope. The beauty of DOST is that its support helps level the playing field for small companies in the Philippines.)

Dealing with the DOST gave him a very positive public service experience. He cited the absence of headache and red tape, prompting him to commend the workers of DOST as "very good."

For more details on how to avail of other DOST-NCR services, please visit http:// ncr.dost.gov.ph or in the Facebook page DOST Ncr.

Aside from SETUP, DOST offers other services in many areas, such as health, environment, education, agriculture, forestry, disaster mitigation, space science, research, and many others which was shown to the public can see during its open house last July 25-29 at the National Science and Technology Week . Visit http://nstw.dost.gov.ph/ for more details. Over a century of pump priming S&T thru untiring efforts of experimentation, research, and development to generate technologies that provide solutions to the needs of its various stakeholders, the industry in particular, essays ITDI's way of achieving its vision, mission, and mandate.

# **DOST- ITDI is now 115 years old**

#### BY DELIA DELICA GOTIS, DOST-ITDI

**THE INDUSTRIAL** Technology Development Institute (ITDI), a multi-disciplinary Research and Development Institution (RDI) under the Department of Science and Technology (DOST) celebrated 115 years of business on July 1, 2016 with the theme "Noon, Ngayon, Bukas".

From its humble beginnings in 1901, ITDI has grown into a globally competitive institution providing R&D and technical services to micro, small, and medium scale (MSMEs) industries, government, private sector, and academe.

"It gives me honor to lead a highly motivated and innovative institution like ITDI. Since its founding in 1901 it continues to thrive and has been ably pushing forward science and technology to where it is now. It is because we believe in our resources' capability - our people, scientists, technical experts backed up with state-of-the-art facilities that enable us to strengthen and sustain our business and services," said Dr. Maria Patricia V. Azanza, ITDI director.

Aside from developing technologies (e.g., food product prototypes from local resources, emergency/relief foods, Tryk ni Juan'), ITDI has also established a number of laboratory testing facilities that now cater to the various needs of its clientele, giving results that are reliable and conforming to industry and international standards. These are being managed by experts in the field.

Among these facilities are the Biological testing laboratories (doing bioassay or tests); Metrology in chemistry (MiC, e.g., analysis of trace metals); Nano technology lab for material science; Packaging lab, for packaging design and development; ADMATEL or Advanced Device and Materials Testing Laboratory doing failure analysis; National Metrology Lab for measurements and calibration, a lab accredited by the Federal Republic of Germany, Deutsche Akkreditierungsstelle (DAkkS), to perform calibrations in the field of mass, temperature, pressure and electricity; and the newly established DOST-ITDI Food Innovation Center (FIC) Main that develops various food products from local resources using DOST-developed food processing machines and provides product development services through training to local food processors nationwide.

Now at 115, it can be said of ITDI that steering the wheels to its successes are its employees, whose different fields of expertise makes for a powerful and creative tool in developing and producing relevant and useful technologies for every Juan.

Through the years, ITDI has become one of DOST's critical partners in achieving improved productivity for our local industries and borrowing the words of former DOST Secretary Montejo, "We were able to make Filipino technology work."

On July 1, the first day of the celebration, "Tryk ni Juan", a tricycle with its driver's roof and side car made of abaca fiber-reinforced composite was launched. Fifteen beneficiaries from our partner tricycle owners and drivers association were awarded with this type of tricycle driver's roofing and fitted to their units. Performance testing of "Tryk ni Juan" is now on-going.



Following the launching ceremony were a press conference, a seminar on abaca fiber composite, and a stakeholder's forum on Industrial Green Composite Applications.

The anniversary celebration continued on July 4 at the Philippine Trade and Training Center (PTTC) where Dr. Cielito Habito, former NEDA director general, delivered a talk. The event also served as a reunion with former ITDI directors who shared their experiences, recollecting past achievements that made big waves for the Institute.

Newly appointed DOST Secretary Prof. Fortunato de la Peña also joined ITDI in its celebration. An employees' funday capped the celebration. Long live ITDI!



# FEMINIZED MALE CARPS INDICATE LAGUNA BAY POLLUTION

BY GERALDINE BULAON-DUCUSIN, DOST-STII

he common carp, known as karpa in the local market, can possibly help in detecting the magnitude of wastes in water ways.

In a study conducted by Dr. Michelle Grace V. Paraso of the College of Veterinary Medicine, University of the Philippines, Los Baños, carp was found to have a potential use as a biomarker in detecting the level of pollutants in the country's water resources.

The study evaluated carp as fish biomarker in determining the contamination of Laguna de Bay in four sites: Sta. Cruz and Paete, Laguna (East Bay) and Taguig City and Muntinlupa City (West Bay).

A biomarker is an organism with a particular substance which may serve as indicator of some natural phenomenon like pollution and various biological pressures like infection and disease.

Dr. Paraso found that majority of the male carps



A scientist collects blood sample from a carp found in one of the study sites.

Smaller testes of the carp makes it "feminized", indicating pollution in sample site.

in study site have shrunk testes compared with that of the normal male carp. Shrunk testes of a male carp indicate that the fish has been feminized. Such feminization shows that the carp was exposed to certain type of pollutant known as estrogen, among others.

According to the study, changes in the reproductive conditions of carp are influenced by several factors, such as food availability, water quality, and temperature.

Estrogenic contaminant or pollutant is estrogen produced through unnatural means. The contaminants developed from chemical components obtained in an environment and they cause reproductive impairment in water organisms such as fish.

Paraso is an expert from the Veterinary Medicine

Division of the National Research Council of the Philippines of the Department of Science and Technology (NRCP-DOST) which funded this study. The study is relevant at this time when the government is pushing for a cleaner environment, especially in the coastal areas where many people live and obtain their livelihood. To know more about the services of NRCP, visit their website: http://www.nrcp.dost.gov.ph (Photos by Val Zabala, DOST-NRCP)

## DOST's "science library in a box" gets to its 1000th site

BY JOY M. LAZCANO, DOST-STII



DOST Secretary Fortunato T. De La Peña (3rd from right) together with Calauan Mayor Buenafrido T. Berris (2nd) and DepEd Supervisor Florentina C. Rancap (1st) led the unveiling of the marker for the 1000th site of STARBOOKS. Also in photo are (from right) DOST Assistant Secretary for Countryside Development Urduja A. Tejada, DOST Region IV-A Director Alexander R. Madrigal, DOST-STII Director Richard P. Burgos, and Provincial S&T Center-Laguna Director Samuel L. Caperina.

**BRINGING THE** mountain to Mohamad. This is exactly what the Department of Science and Technology (DOST) has done in regard to bringing S&T information to the grassroots. Through the Science and Technology Academic Research-Based Openly Operated Kiosks or STARBOOKS, DOST reached places that had limited S&T information resources nor Internet connection.

STARBOOKS is the country's first digital library with hundreds of thousands of S&T information content. Developed by the DOST's Science and Technology Information Institute, STARBOOKS recently celebrated another milestone.

In a community in Laguna, STARBOOKS marked its 1000th site with the installation of four units at the Dayap National High School in Brgy. Dayap, Calauan, Laguna. Currently, STARBOOKS has deployed more than 1,123 units in several barangays and municipalities in the country.

Accessible on-site even without Internet connection, STARBOOKS provides students, researchers, and S&T aficionados with thousands of free S&T related materials in text, audio, and video formats.

Among these are K-12 interactive courseware on math and science developed by DOST's Science Education Institute, livelihood videos dubbed as "TamangDOSTkarte" which provides parents and entrepreneurial students a thing or two about various livelihood opportunities within their sphere of interest, and other videos.

Furthermore, unlike Internet searches, STARBOOKS assures the public that they are accessing credible sources of information.

Witnessing the milestone are DOST Secretary Fortunato T. de la Peña and Calauan Mayor Buenofrido Berris. "We at DOST," said de la Peña, "are striving to cut boundaries so we can reach those who are in need of our services and assistance, alleviate poverty, and expand our local industries."

He added that STARBOOKS is proof of DOST's innovativeness and its commitment in providing significant technologies that answer to the needs of the public.

One of the prevailing problems in the country that affect development is the slow Internet connection, which curbs learning. This area of concern is now being addressed through STARBOOKS as it provides offline and royalty-free S&T resources.

Launched in 2012, STARBOOKS units were first deployed at DOST Regional Offices XI and IX, and in Zamboanga City High School. Succeeding years saw the number of sites rise until it finally reached its 1000th.

# ASEAN patents increased by 40% in past three years

The Thomson Reuters report, which examines ASEAN research and patenting activity, also shows that the group almost doubled its share of the world's research papers.

Asian Scientist Newsroom | August 30, 2016 | Top News

http://www.asianscientist.com/2016/08/topnews/thomsonreuters-emerging-research-and-innovation-hub-report-asean/

AsianScientist (Aug. 30, 2016) - The Association of Southeast Asian Nations (ASEAN) almost doubled its share of the world's scientific literature, and increased its patenting activity, a common industry measure of innovation, by more than 40 percent in the last three years.

These are just some of the key findings from the "ASEAN – The Emerging Research and Innovation Hub" report produced by the Intellectual Property & Science (IP & Science) business of Thomson Reuters, which suggests that the ASEAN region is becoming a hub of research and innovation activity.

The regional research output is dominated by research communities in Singapore, Malaysia and Thailand, which account for 85 percent of the region's research publications followed by a second group comprising Vietnam, Indonesia and the Philippines.

Some key findings from the report are:

• The ASEAN group has nearly doubled its share of the world's scientific literature, as indexed in the Web of Science, from 1.37 percent

in 2006 to 2.43 percent in 2015.

• Malaysia, Brunei and Vietnam have all sharply increased their output of research papers in the last decade, with each posting gains of at least 300 percent between 2006 and 2015.

• Patenting activity from the ASEAN group has increased more than 40 percent in the last three years. Patent filings by domestic organizations as a proportion of total filings have risen from less than 9 percent in 2005 to nearly 12.5 percent in 2014, suggesting that the ASEAN nations' investment in home-grown R&D efforts is beginning to yield benefits.

• The technology concentration of the ASEAN group, as reflected in patents, is focused more towards the chemical, agricultural and medicinal sectors and less toward semiconductors and telecommunications.

Source: Thomson Reuters; Read more from Asian Scientist Magazine at: http://www.asianscientist.com/2016/08/topnews/



thomson-reutersemerging-research-andinnovation-hub-reportasean/

# Bendable concrete doesn't crack under pressure

**SCIENTISTS IN** Singapore have developed a type of bendable concrete that is stronger than regular concrete.

Asian Scientist Newsroom | August 24, 2016 | Technology

http://www.asianscientist.com/2016/08/tech/bendableconcrete-conflexpave-ntu-jtc-singapore/

AsianScientist (Aug. 24, 2016) - Scientists from Singapore have invented a new type of concrete that is both bendable and stronger than regular concrete.

Typical concrete is comprised of cement, water, gravel and sand. While this mixture makes concrete hard and strong, it does not promote flexibility. Thus, concrete is brittle and prone to cracks if too much weight is applied.

Designed by a team at the Nanyang Technological University-JTC Corporation Industrial Infrastructure Innovation Center (NTU-JTC I<sup>3</sup>C), ConFlexPave is specifically engineered to have certain types of hard materials mixed with polymer microfibers. The inclusion of these synthetic fibers, besides allowing the concrete to flex and bend under tension, also enhances skid resistance. The key breakthrough was understanding how the components of the materials interact with one another mechanically on a microscopic level, said Assistant Professor Yang En-Hua, who led the research.

"With detailed understanding, we can then deliberately select ingredients and engineer the tailoring of components, so our final material can fulfill specific requirements needed for road and pavement applications," Yang said.

According to Yang, the hard materials give a non-slip surface texture while the microfibers, which are thinner than the width of a human hair, distribute the load across the whole slab. This mix results in a concrete that is tough as metal and at least twice as strong as conventional concrete under bending.

ConFlexPave has been tested as tablet-sized slabs in the laboratory, and will be scaled up for further testing at suitable locations within

JTC's industrial estates and at NTU.

Source: Nanyang Technological University. Read more from Asian Scientist Magazine at: http://www.asianscientist. com/2016/08/tech/ bendable-concreteconflexpave-ntu-jtcsingapore/

# IBM Watson to fight cancer in 21 hospitals across China

IBM and Hangzhou CognitiveCare plan to bring the Watson cognitive computing platform to 21 hospitals across China.

Asian Scientist Newsroom | August 23, 2016 | Pharma

http://www.asianscientist.com/2016/08/pharma/ibm-watsononcology-china-hospitals/

AsianScientist (Aug. 23, 2016) - 21 hospitals across China plan to adopt Watson for Oncology, a cognitive computing platform that learns over time and helps oncologists with their work.

The platform draws from more than 300 medical journals, more than 200 textbooks, and nearly 15 million pages of text to help physicians deliver personalized, evidence-based cancer treatment options.

According to IBM, Watson can help increase efficiency for oncologists by scoring and ranking medical literature, quickly summarizing patient records and analzying massive volumes of medical literature to identify individualized treatment options. Its machinelearning capability means it is continually learning over time.

Watson's debut in China comes at a time when cancer cases are increasing in the region. The initial 21-hospital introduction is part of a multi-year partnership through which Hangzhou Cognitive Care will introduce Watson for Oncology to hospitals across China.

While Watson for Oncology will initially be available in the English language only, CognitiveCare will provide some translation support to ensure Watson's treatment insights, such as drug labels and treatment guidelines, are available to customers in the appropriate Chinese



dialects. Additionally, CognitiveCare will localize dosing based on Chinese medical guidelines.

Source: IBM. Read more from Asian Scientist Magazine at: http:// www.asianscientist. com/2016/08/pharma/ ibm-watson-oncologychina-hospitals/

# Mass transit is starting to embrace electric buses

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**BY MATT** McFarland @mattmcfarlandSeptember 12, 2016: 12:59 PM ET

http://money.cnn.com/2016/09/12/technology/electric-transitbuses-proterra/index.html

City buses may one day plug in and charge just like a smartphone.

Electric car sales are on the rise, but that's not the only place where electric vehicles are starting to make a mark.

Proterra, a maker of heavy-duty electric vehicles, announced Monday that its latest bus can travel between 194 and 350 miles on a charge. Its previous buses maxed out at 193 miles per charge.

Proterra believes its bus, called the Catalyst E2, is capable of handling the workload of nearly every U.S. mass transit route on a single charge. The bus, which can cost in excess of \$800,000, stores up to 660 KWh of energy -- that's 10 times the energy of the standard Tesla Model S.

"We're seeing the beginning of the end in fossil fuels in mass transit," said Proterra CEO Ryan Popple.

Proterra's buses are currently in 10 cities, and it has sold more than 312 vehicles to 35 different municipal, university, and commercial transit agencies in North America.

The company's 2015 sales matched its sales from its first 10 years combined, according to Popple.

Related: Volkswagen to build electric cars in China

Bus companies around the country are slowly warming to the technology. In May, Foothill Transit, the bus operator in the Pomona and San Gabriel Valleys outside Los Angeles, announced its 300-bus fleet would convert to all electric by 2030.

Today, Foothill Transit has 17 electric buses, all made by Proterra, that have driven more than one million miles. It received its first electric bus in 2010.

The agency's buses have eliminated 2,616 tons of greenhouse gases since then. Another benefit of electric buses is a quieter ride. Passengers won't feel vibrations that come from a gas or diesel engine.

Foothill Transit frequently hears from other transit agencies who are curious about electric buses.

Spokeswoman Felicia Friesema expects more agencies will turn to electric buses due to improved reliability and maintenance benefits. The key, she said, is to make it a seamless shift for bus companies. If too many infrastructure changes need to be made, going electric is unappealing.



"It's happening now," Friesema said of the shift. "I don't know what the tipping point will be."

# **Book Review** CAUSE OF DEATH By Patricia Cornwell

#### BY ROMELIE JANELLE MARANAN, DOST-STII

**NO DOUBT,** crime fiction involving forensic science and crime investigation is one of the most interesting genres of all time, whether in books, television, or movies. Mystery stories have been continuously patronized by a lot of people, and so far, show no sign of slowing down.

Award-winning American contemporary writer Patricia Cornwell is considered one of the best crime writers in history. Widely known for her series about the forensic science heroine Dr. Kay Scarpetta, Cornwell's the one to look for if you are into mysteries.

The seventh installment of the Dr. Kay Scarpetta series, Cause of Death, is the first book of Cornwell that I have read. Tight, gutwrenching, fast-paced and frightening, Cause of Death is definitely impossible to put down until the last page.

Infamous forensic pathologist Dr. Kay Scarpetta puts herself into another unwanted, challenging case while she covers for her deputy chief medical examiner, Dr. Philip Mant on New Year's Eve. Dr. Scarpetta receives two phone calls reporting the death of a prominent journalist, Ted Eddings, whose corpse is found 30 feet below the icy Elizabeth River at the vicinity of the inactive Naval Shipyard. Being the chief medical examiner for Richmond, Virginia, she is assigned to investigate the latest fatality.

Teddings allegedly drowned in the river while diving illegally for Civil War memorabilia. But in the course of the investigation, some officials of the naval shipyard who are supposed to help her, act pretty strange and treat her with contempt, leading her into thinking that the incident was intentional.

The corpse is taken to Dr. Scarpetta's office for autopsy, where she is aided by their morgue assistant, Danny Webster. She concludes that the victim did not die from drowning. Moreover, discrepancies on the evidences keep on emerging.

Dr. Scarpetta's sidekicks from the previous books also figure out in the story. Richmond Police Department Captain Pete Marino, her beloved niece, FBI agent Lucy Farinelli, and her love interest, FBI Profiler Benton Wesley once again back her in the investigation.



Soon, morgue assistant Danny is also murdered, giving Dr. Scarpetta a hint that she has entered a very dangerous and unusual case which puts her and her beloved ones in great peril.

Furthermore, they discover that the case involves a cult dubbed "New Zionists" and cause a terrorist attack that endangers thousands of lives.

First time Cornwell readers would find Cause of Death a great book, especially those who are fond of crime/ forensic stories. The tasks of a forensic pathologist are carefully detailed in the first parts - saving the readers from using a medical dictionary while reading.

Obviously, Cause of Death covers a considerable amount of topics about forensic science and biotechnology, with Cornwell able to define some scientific terminologies and processes during crime investigations like she is a medical examiner herself.

Cornwell takes us to the world of the corpses - introduces to us "death terms" like rigor mortis or the stiffness of the body which is a sign of death; post mortem or autopsy, a medical procedure done to know the cause of death; cold livor, or turning of the skin color into bright pink due to exposure to cold, etcetera.

The procedure of autopsy is also detailed step by step in the book, as well as the tools

and technologies used during the process. The author also manages to share with readers the ways of knowing if the corpse died from drowning or chemical toxic, what deadly weapon was used in killing a person, how diseases like AIDS and hepatitis can be acquired, and the effects of radiation poisoning.

Portions are also devoted to discussions about where uranium and plutonium can be found, and how they can affect people and their environment. Cornwell also talks about the isotopes of the elements, but unfortunately, the author does not give light to this topic which might cause confusion among the readers.

Aside from science, technologies, computers, and robotics are also highlighted in the book, depicted in a very futuristic fashion, considering the time that the book was written.

But apparently, the flow of the story is very confusing and too fast paced. At one point, the characters are just doing their job as crime investigators, but the next thing you'll know they are already saving the world like what superheroes do. Some parts are kind of tedious because they are less convincing, but one will continue reading to know what will happen next. Good thing Cornwell uses light words, making the whole book easy to understand. However, it may be better if the readers peruse the first books of the series before going into the Cause of Death.

The world, especially the Philippines, is in dire need of more science professionals. Maybe this book, and other crime stories, can help convince our youth to pursue forensic and medical professions in the future. Who knows, Cornwell's readers might be our next Detective Conan, Sherlock Holmes, Dr. Kay Scarpetta and CSI agents.

S&T Post welcomes contributions for our Book Review section. Please email your contributions to eadeleon.dost@gmail. com. Reviews should tackle the book's science and technology component, subject to the approval of the Executive Editor. For inquiries, call 837-2191 local 107 and look for Gigi de Leon.

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Movie Review

# **Mad Max : Fury Road**

By KARL RAVEN A. RAMON, DOST-STII

**IN THE** dire world of the mad, a barren wasteland and desert land have emerged caused by a nuclear holocaust that later resulted to ecological collapse.

This is the setting of the latest Mad Max movie sequel, titled "Mad Max: Fury Road," after the last one titled Mad Max: Beyond Thunderdome in 1985.

Few survive the abomination of a radioactive fallout and famine. One of them is Max Rotchatansky, also called "blood bag", a lone-wolf survivor portrayed by Tom Hardy who later gets caught by the War Boys serving their God, Immortan Joe, under the Cult of the V8, a religion which worship automobiles.

Max becomes vital to the existing society upon knowing he is a universal blood donor – for Type O blood. Nux, one of the War Boys, is in need of a blood transfusion as he suffers from ARS-like (Acute Radiation Syndrome) symptoms such as red patches, acute radiodermatitis and blistering caused by the radioactive environment. Higher exposure to radiation can cause anemia and lymphoma as it kills blood cells including white blood cells.

Meanwhile, Immortan Joe's female general, Imperator Furiosa portrayed by Charlize Theron, escapes from the former's tyranny. Hot on the trail of the escapee on Fury Road, Nux brings Max along with him and the desert rage quest begins.

The post-apocalyptic movie gives emphasis to the scarcity of water. Oceans evaporate as well as groundwater due to the heat wave caused by nuclear outbreak.

This somehow opposes real-life situation if ever a nuclear outbreak occurs. Just like volcanic eruptions which send gases like sulfur dioxide, hydrogen chloride, and hydrogen fluoride gases and dust particles to the atmosphere making the temperature colder than normal as they block and absorb the heat energy from sunlight, cloud mushrooms from nuclear explosion will do the same cooling purpose.

However, the movie's claim of famine may be possible due to acid rain caused

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by those gases and radioactive ions in the atmosphere, killing livestock and vegetation. From the film's beginning, not one of the characters can be seen lunging for food. Although we see Immortan Joe passing through plant crops, there is not a single meal scene despite the 1-2 days hot pursuit in barren land.

Acidic environment makes the trees vulnerable to the forces of nature, breaks down aluminum ions from soils which later intoxicate aquatic animals and by means of biomagnifications in cases like "red tide," it passes through its predators. Consuming food affected by acidic environment can indeed be lethal to humans.

According to nuclearweaponarchive.org, nuclear explosions produce both immediate and delayed destructive effects. Immediate effects such as blast, thermal radiation, and prompt ionizing radiation are produced and cause significant destruction within seconds or minutes of a nuclear detonation. The delayed effects such as radioactive fallout and other possible environmental effects inflict damage over an extended period, ranging from hours to centuries, and can cause adverse effects in locations very distant from the site of the detonation. This might explain the instant fallout of the population while the delayed effects of nuclear explosion still haunt those who survive.

The site also says that nuclear winter is possible after a massive nuclear explosion of big cities, contradicting the movie's setting. One example is the 1815 eruption of Tambora Volcano in Indonesia – the largest volcanic eruption in recent history. Tambora sent immense gas and dust particles that made "a year without summer" possible in North America and Europe in 1816.

Worse climate disturbances may occur after a nuclear explosion since soot, the nuclear counterpart of volcanic dust particles, is hydrophobic and small in size, making it hard to flush in the atmosphere. Soot is also more efficient in absorbing sunlight than volcanic dust, thus less sunlight will enter the earth's surface with average temperature reduction at 10 degrees Celsius that can last months.

Mad Max in snow world is another thing, but now we enjoy him in the desert and canyons where it (Mad Max setting) is certainly not within the safe neutral ph level of 6.6-7.3, making it a place where humans are paradise for cancer cells.

However, science and technology in radiation and nuclear energy can be advantageous if used properly. In fact we, humans emit radiation. Almost everything emits radiation - the potassium-rich banana is radioactive, mashed potatoes, your Friday beer, but this radiation is not harmful. Only ionizing radiations are harmful to humans like Gamma, UV and X-ray.

Technically, the latest Mad Max's production design is superb and realistic, bagging the "Best Production Design" award for 2016 from no less than the Oscar Awards.

S&T Post welcomes contributions for our Movie Review section. Please email your contributions to eadeleon.dost@gmail. com. Reviews should tackle the movie's science and technology component, subject to the approval of the Executive Editor. For inquiries, call 837-2191 local 107 and look for Gigi de Leon.





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AFFORDABLE DENGUE TEST KIT | A \$10 dengue kit in the US costs \$100 here, according to Dr. Raul V. Destura who heads a start-up company called Manila Health Tek. Destura led a team of scientists in developing Biotek-M (inset), a rapid dengue test kit that is more affordable to Filipinos. Destura said that technology adoption cut the "toll fees" that make dengue testing expensive in the country. Biotek-M was developed through funding from Department of Science and Technology-Philippine Council for Health Research and Development and its commercialization is supported by DOST's Technology Application and Promotion Institute. (Framelia V. Anonas, S&T Media Service)

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