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PHILIPPINES

From science then communication, to science communication

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This chapter discusses the contexts surrounding the development of science communication (scicom) practices in the Philippines, tracing its history from the pre-Spanish colonial period onwards. Evidence shows that science was communicated in popular media during the Spanish colonisation period, which ended in 1898. Massive political and institutional changes happened during and after the American occupation, leading to the further development of science and scicom. As the Philippines is mostly an agricultural country, the practice of scicom was rooted in agricultural journalism, which might explain why initiatives until now focused more on popularising applied rather than theoretical science. As an academic track, scicom developed under the theory and practice of development communication, thus creating a distinct local style that is non-media centric and guided by participatory approaches. Case studies in scicom pertaining to agriculture, disaster management and health, as well as its challenges, are presented. The realisation of the role of scicom took a slow course, but innovative programs are now picking up after issues like Bt corn and eggplant, typhoon Haiyan and Dengvaxia triggered a greater appreciation of its value in everyday lives.

1. Introduction

The Philippines is a mere dot on the global map, a country of more than 7,600 islands in southeast Asia. Due to its abundant natural resources and biodiversity, it was a magnet for colonisation: by Spain, the United States and

then by Japan. By the time the Philippines gained independence in 1946, colonialism had greatly influenced the institutional, cultural and general psyche of Filipinos.

It is in this environment that the development of science and technology (S&T) unfolded. Colonial policies from the 1700s to 1900s inhibited a relevant and nationalistic science community. Research and development (R&D) efforts focused on serving colonial objectives rather than the national interest. Instead of frontier research, investigations centred on taxonomy, discovering natural resources and identifying flora and fauna for by-products that would make a competitive mark in world trade. This perspective would influence the initial and even post-colonisation establishment of a national science agenda (Chamarik and Goonatilake, 1994).

Despite this initial dim scenario, the Philippine constitution in 1935 and the Science Act of 1958 articulated the role of S&T as a tool for national development. It took a series of reorganisations, downsizing of the bureaucracy and limited participation of the private sector to highlight government support to S&T. The role of scicom would thus take an even slower course, although various activities had already been started without being labelled as such. Once this field was given the attention it deserved, the appreciation for popularisation of S&T, knowledge-sharing initiatives, stakeholder engagement and the need to develop a core of science communicators through formal and innovative strategies were realised. These practical actions were accompanied by the emergence of an academic community from about 1985 that would offer courses in scicom. Its graduates would eventually influence minds not only in the Philippines but also in other countries in Africa and Asia and contribute to a global network of science communicators.

2. Brief pre-modern history of Philippine science communication

It is rather difficult to accurately recount scicom's history in the Philippines, as a unified, systematic study is yet to be done. There is no local academic journal title that focuses solely on scicom, although more recently articles about Philippine scicom have been published in various local and international communication journals.

It is clear that Filipinos during the pre-colonial times had deep knowledge of science and engineering, as evidenced by the richness of indigenous concepts and language in local astronomy (Ambrosio, 2010) and the design and creation of the Ifugao Rice Terraces (Conklin, 1980). Forms of scicom

were present in pre-colonial times, with indigenous tribes passing down traditional knowledge of herbal remedies and agricultural practices. Some of this knowledge was written on perishable bamboo (Morrow, 2002), while other material was delivered through oral means, resulting in these traditions being overlooked and largely unrecorded until recently (Daoas, 1999). Some historical documents during the Spanish colonial period, however, indicate a more likely way science was communicated. Scientific advancements were led by priests of different religious orders (Velasco and Baens-Arcega, 1984; Anderson, 2007).

Later on, dissemination of agricultural information increased, especially during the time of Governor General Jose Basco y Vargas in the 1780s. During his term, the Sociedad Economica de los Amigos del Pais [Economic Societies of Friends of the Country] was formed as a private association of 'learned individuals' that aimed to improve agriculture in the country (Velasco and Baens-Arcega, 1984). This paved the way for communicating agricultural concepts and practices through technical and popular media. The Sociedad was also credited for establishing a comprehensive library and a museum of natural history (Anderson, 2007).

The final years of Spanish colonisation were marked by the establishment of science-related bureaus like the Manila Observatory in 1865, the founding of the University of Santo Tomas' Museum of Arts and Science in 1871 and advancements in medicine, such as anti-smallpox, cholera and leprosy campaigns (Velasco and Baens-Arcega, 1984; Anderson, 2007). At about this time, some vernacular newspapers like *El Ilocano* (founded in 1889) published science news articles. In its 28 June 1889 issue for example, an article featured topics including the origin of the earth, solar system, astronomy and geography. Some issues published articles about mathematics and proper counting (Montemayor, 2014).

By the American colonial period in the early 20th century, science had improved tremendously—many scholars were sent abroad for graduate studies through scholarships, and foreign grants and aid helped foster a stronger local science culture. In 1905, the Bureau of Science was established, evolving in 1987 into the current Department of Science and Technology (DOST) (Velasco and Baens-Arcega, 1984). Other bureaus, and eventually departments, were similarly set up for agriculture, health and natural resources. These departments would conduct their own R&D and have their own information and communication units.

3. Philippine science communication throughout the modern period

The advances made by the Philippines in science and its communication came tumbling down during the Japanese occupation in the 1940s. During this time, educational and scientific activities were practically halted. The capital Manila, the centre of such activities, was reduced to ruins during battles for liberation, virtually wiping out all previous research efforts and scientific collections (Caoili, 1987).

Come 1946, massive efforts were needed to reconstruct the newly independent Philippines, with the 1950s proving to be a tumultuous time for local scicom. Along with the massive efforts towards industrialisation mainly due to foreign aid, science and science education were seen as important drivers of socioeconomic progress. Thus, milestones occurred during the decade, such as the first Philippine National Science Week in 1951 (Official Gazette of the Philippines, 1951) and the creation of the now-defunct Science Foundation of the Philippines (SFP) in 1952,[1] a public corporation mandated to encourage the creation of school-based science clubs and societies. SFP was credited with starting the science club movement in 1956 (Antiola and Jose, 1982).

Scicom also existed in popular culture, like Teodorico Santos' alien invasion film *Exzur*[2] produced in 1956, which was one of the earliest, if not the first, sci-fi movies made in the Philippines (Santos, 2008a). It was around this period, however, that a report submitted by the Chairman of the Senate Committee on Scientific Advancement indicated the lack of science consciousness among Filipinos (Chamarik and Goonatilake, 1994). Since the nature of research then was basically a technology push rather than demand-driven, dissemination efforts were fragmented and few.

Science promotion and education thereafter became a priority area for S&T in the 1960s. The first science fair happened in 1960, and it became a national event in 1965 (Dagdayan, 1978). The first science quiz contest was spearheaded by SFP in 1961 and progressed into a national science quiz contest in 1969 (Reyes, 1978). To teach science using the vernacular, the Akademya ng Wikang Pilipino [Academy of the Filipino Language] started a

1 Republic Act No. 770, Congress of the Philippines, 20 June 1952.

2 Other notable classic local sci-fi movies include Richard Abelardo's *Zarex* (1958), about Filipino astronaut landing on the moon (Santos, 2008b); and also his *Tuko sa Madre Kakaw* (Gecko in Madre Kakaw, 1959), a story of a mad scientist who invented a serum turning animals into monsters (Santos, 2008c). Unfortunately, copies of these movies are now considered lost.

project to find words and/or translate science jargon into Filipino, the national language, for use in teaching science in schools. Their efforts resulted to the publication of an English–Filipino technical vocabulary dictionary in 1967.

It was also during the 1960s that experimental educational TV shows were commissioned through the Ateneo de Manila University's Educational Television Division (Rodrigo, 2006). Eventually, the drive to use mass media to educate youth through 'edutainment' initiatives paved the way for the classic 1980s children's program *Batibot* [Small, but Strong], which occasionally tackled science and maths subjects; and the mid-1990s hit *Sineskwela* [School on Air], a TV program intended to supplement the classroom-based elementary science education curriculum. The show reportedly reached about 14 million school children nationwide, with some research indicating that it resulted in improved science comprehension (Rodrigo, 2006). Many other child-oriented TV programs that tackled science topics followed later. Enhancing science education by training science teachers through TV programs was also initiated in the mid-1990s (Department of Education, 1997).

In terms of other popular media, local movies involving 'scientists' reached the height of their popularity during the 1970s and 1980s. Almost similar to the depictions of scientists in other countries, scientists in these films were usually portrayed as an evil expert, a mad intellectual, a helpless victim, a hermit prodigy, a foolish professor, a well-rounded genius or a heroic creator (Montemayor, 2013).[3]

The concept of development journalism, articulated in the late 1960s, was a response to Third World problems like poverty, low productivity and social inequality. This demanded writers go beyond mere reporting of facts to probing the 'depths of human drama'. The Philippine News Agency and the Philippine Press Institute had a team of writers concentrating on in-depth developmental news that covered, among others, population, agriculture, public health, environment and S&T (Jamias, 1987).

By the 1970s, science journalism had become a buzzword. Campus journalism became a regular component of SFP's annual Youth Science Camp Project since its first campus science journalism activity in 1971 (Ongoco, 1978). That same year the National Science Club of the Philippines, and the Science

3 Some examples of notable films that portray scientists as: (1) an evil expert: Ben Feleo's *Kalabog en Bosyo Strike Again* (1986); (2) a mad intellectual: Luciano Carlos' *Super Wan Tu Tri* (1985); (3) a helpless victim: Armando Garces' *Darna vs the Planet Women* (1975); (4) a hermit prodigy: Mike Relon Makiling's *Fly Me to the Moon* (1988); (5) a foolish professor: Tony Y. Reyes' *Fantastic Man* (2003); (6) a well-rounded genius: Ben Feleo's *The Crazy Professor* (1985); and (7) a heroic creator: *Bebong Osorio's Biokids* (1990).

Club Advisers Association of the Philippines, Inc. were formed (Dapul, 1978; Vergara, 1978). The first National Science Journalism Workshop for professional journalists, science club advisers and campus writers was implemented two years later, noting that science writing was a 'new Philippine frontier' (Bautista, n.d.). In 1976, the now-defunct Depthnews Science Service was launched in Manila. It provided weekly science features and radio scripts that would eventually reach about 250 newspapers and 300 radio stations in Asia and Pacific Islands (Amor et al., 1987).

Also worthy of mention is the role of UNESCO in accelerating science education in the country. For example, the SFP hosted the UNESCO-funded Asian Training Course for Leaders in the Promotion of Public Understanding of Science, Technology, and Environment (PUSTE) from 15 February to 14 March 1977. The training gathered 26 Asian leaders from 10 Asian countries to promote and 'institutionalise PUSTE through their out-of-school science, technology and environmental education (OSSTEE) program' (Science Foundation of the Philippines, 1978, Foreword). Two of the most important outputs of the training were: (1) the development of a framework for the promotion of PUSTE; and (2) the establishment of the Asian Coordinating Council on PUSTE.

The Annual DOST Media Awards commenced in 1988, giving recognition to practitioners from radio, television, print and, more recently, the cyber press. Other R&D institutions then started giving their own scicom awards. By mid-2001, the Philippine Science Journalists Association (PSciJourn) was formally organised as a non-profit association of media practitioners aiming to 'provide a dedicated network of people who realise the socio-economic transforming power of S&T'. It aimed to support the government's effort in developing an informed citizenry (Bautista, n.d.). Proclamation No. 437, s. 2003 (Official Gazette of the Philippines, 2003) declared every third week of July as Science Journalism Week. PSciJourn is mandated to conduct activities during this celebration.

Science centres were established by the government in Metro Manila. These include the National Planetarium in 1975, which also features astronomical myths and beliefs, and the Philippine Science Heritage Center in 1998, which details the history of local science. In response to the government's call for private sector support in science promotion, the Philippines' first interactive science centre—the Philippine Science Centrum—was established in 1984 in Marikina.

At this point, scicom was more unidirectional, reflecting the view that S&T information needed to be packaged in a form to encourage its appreciation and understanding. This would eventually progress into a more proactive process where communication had a significant role in creating an environment that enabled knowledge sharing and public engagement in an open and transparent dialogue.

4. The current state of science communication

Velasco (1998) reported that DOST stakeholders and communication practitioners felt that public appreciation of S&T was lacking, suggesting that science consciousness was low and bordering on apathy. However, the advent of biotechnology just before the start of the 2000s changed this scenario. Suddenly, a mere option in a scientist's toolbox generated diverse scientific, political, cultural and even religious viewpoints rendering it, as Liakopoulos (2002) noted, more of a social issue than a technological development. Projects were initiated and the hiring of science communicators commenced as funding support was made available by government, private sector and non-government organisations. A 2006 study indicated a shift in public awareness of the technology and increased use and access of information sources (Torres et al., 2006). During this period, an increase in Bt corn planting was documented.

Likewise, institutions started to adopt innovative methods in communicating science. Participative approaches like Cafe Scientifique were popularised in the Philippines by the Mind Museum in 2011. To further widen the scope of scicom, DOST initiatives like the Science Explorer Bus and NuLab (both are mobile science laboratories); and STARBOOKS (Science and Technology Academic and Research-Based Openly Operated Kiosks), a set of stand-alone digital S&T libraries, were deployed to geographically remote and economically disadvantaged areas with limited or no access to the internet. Indie-Siyensya, a science filmmaking contest, was initiated by DOST in 2016. Although all sub-agencies under DOST have their own scicom initiatives, the National Science and Technology Week (NSTW) celebration serves as a venue to showcase S&T through innovative scicom methods (Figure 28.1). The Department of Health's (DOH) various health campaigns, the Department of Agriculture's (DA) initiatives in communicating agriculture-related information to different stakeholders, and the Department of Environment and Natural Resources' (DENR) citizen science initiatives also regularly contribute to local scicom.

Given the country's susceptibility to natural disasters, weather and climate science topics have become increasingly prominent in various forms of the media, especially the internet. In 2009, the local broadcasting network GMA launched the nation's first dedicated science and technology online news section. Around this time, sub-agencies of the DOST, specifically those pertaining to disaster preparedness like PAGASA (Philippine Atmospheric, Geophysical and Astronomical Services Administration) and PHIVOLCS (Philippine Institute of Volcanology and Seismology), created popular pages on social media platforms for the quick and easy dissemination of important weather updates and safety information.

To combat the low profile of the DOST and science in the national consciousness, DOSTv, a weekday television program shown on the state-owned television channel, was launched in 2017. The program includes weather reports, interviews with scientists and officials, local and international science news and even S&T trivia (Burgos, 2017).[4] Homegrown resources like FlipScience, which prides itself as the first Filipino-made popular science website, have also materialised. Finally, individual science advocates, ranging from university-age science enthusiasts to established scientists and physicians, have built up a significant digital presence, enabling the unprecedented reach of S&T especially among younger Filipinos. A recent trend of fusing science and art also opens endless possibilities as a useful platform for public discourse.

Although the prominence of scicom efforts is at an all-time high, it is too early to tell if these have successfully embedded a culture of science in the national consciousness. However, as described later in the chapter, history has shown that initiating conversations on scientific topics can result in actionable change. Indeed, the ongoing story of scicom is an engrossing one, with a myriad of successes and even setbacks contributing to a robust scicom environment.

5. Public attitudes towards science and technology

Different nationwide surveys that aim to find the public's attitudes toward science and technology, such as that of the International Social Survey Programme (ISSP) and World Values Survey (WVS), have revealed a very

4 ABS-CBN's Knowledge Channel continues to air children-oriented science and mathematics programs, such as *Science Says* and *Sineskwela* re-runs. In July 2019, DOST launched *Siyensikat* over GMA News TV showcasing DOST-developed technologies.

interesting pattern: Filipinos' perception leans toward the negative side when asked about 'science' alone, but leans toward the positive one when asked about 'technology'.

For example, five ISSP surveys between 1993 and 2010 showed that there is an increasing trend in the number of Filipinos who agreed in the statements 'Overall, modern science does more harm than good', and 'We believe (trust) too often (too much) in science, and not enough in feelings and faith (religious faith)'. Respondents are becoming increasingly divided in their opinions in both statements.

The WVS survey in 2012 showed the same pattern. More Filipinos agreed than disagreed with the statements 'One of the bad effects of science is that it breaks down people's ideas of right and wrong', 'We depend too much on science and not enough on faith', 'Whenever science and religion conflict, religion is always right', and 'It is not important for me to know about science in my daily life'.

The general perception changes when Filipinos are asked about technology. Different WVS surveys revealed this finding. For example, those who believe that 'the scientific advancements we are making will help mankind' have increased by 50 per cent from 1996 to 2001. More Filipinos believe that it is good to 'give more emphasis on the development of technology' in the future, based on surveys done in 1996, 2001 and 2012. In 2012, the survey found that more Filipinos think that the world is better off because of technology than those who believe otherwise. More Filipinos agreed than disagreed in the statements 'Because of science and technology, there will be more opportunities in the next generation', and 'Science and technology are making our lives healthier, easier, and more comfortable'. Interestingly, two ISSP surveys found that more than 60 per cent of Filipinos feel proud about the country's scientific and technological achievements, and that the number has increased from 1995 to 2003.

Although these surveys seem to suggest that Filipinos are sceptical about science (e.g. Mangahas, 2018), the generally positive attitude towards technology shows their appreciation for more tangible outputs, or applications, of science.

6. Science communication as an academic discipline

Scicom as a local academic track is rooted in agricultural journalism, developed under the field of development communication (devcom). This enabled the flourishing of a distinct brand of scicom—one that is focused

on applied science (particularly agriculture), which places a premium on the role of information science in scicom; is non-media centric; and is guided by participatory and public engagement approaches in communicating science to non-expert publics.

In 1954, the Office of Extension and Publication (OEP) was established in the then University of the Philippines College of Agriculture's (UPCA) Department of Agricultural Education in Los Baños, Laguna. OEP was mandated to help communicate and 'popularise' research results in agriculture to farmers. This office—where Nora Cruz-Quebral, the scholar who first defined devcom as a field, worked as a copyeditor upon earning her bachelor's degree—regularly published bulletins, pamphlets and brochures, and sent science news to major national broadsheets. Professor Juan F. Jamias, regarded as one of the earliest post-war agricultural journalists, worked here alongside Quebral. This experience of interfacing with non-expert publics, as well as the need to formalise communication training for agriculture students, put the OEP in the right position to offer a related academic course. The first course in agricultural communication was instituted in 1960, and a master's degree in agricultural communication—the first in the Philippines—in 1965. The OEP became a separate department, and after Quebral articulated 'development communication' as a field in 1971, it was renamed the Department of Development Communication in 1974 (Figure 28.2). In 1972, UPCA grew into an autonomous university, UP Los Baños (UPLB).

In the early 1970s, Professor Jamias articulated the idea of establishing scicom as a formal field of study within the context of devcom. A formal course on science reporting, essentially focusing on print, was instituted in 1974, although the course contents had already existed before under a different course title.

Although communicating research results is in itself a form of scicom, the scholarly roots of scicom 'UPLB-style' focused more on the implications of emerging information and communication technologies in information processing and access (Jamias, 1989). As early as 1983, the department formally discussed developing a scicom program (Librero, 2000; Jamias, 1984). Jamias initially conceptualised what he first called 'scientific communication' to refer to the communication of scientific and technical information, the idea of which was mainly based on his experiences in information technology as a visiting professor at the University of Sydney in 1984 (Jamias, 1984).

Impressed with what he saw, he went back to the Philippines in 1985, and proposed 'scientific communication' as an academic major in development communication, with a strong leaning toward information and library science.

Felix Librero, then department chair, strongly supported this idea. Together, they pushed for scicom to be included in the development communication curriculum. Although this idea was received favourably, the time was not yet ripe to proceed with the plan.

The first formal graduate course in scicom was instituted in 1985 (Jamias, 1997), and several students who enrolled in devcom eventually introduced scicom in their own university's communication courses. These universities include Xavier University in Northern Mindanao and Visayas State University in the Eastern Visayas, both of which had initiated fully fledged devcom undergraduate programs by 1986 (Visayas State University, 2016; Xavier University Development Communication Department, 2017). Other institutions have also instituted their own science journalism courses.[5]

Although the proposal for a scicom department was dropped in the mid-1980s, the department—now the Institute of Development Communication—continued the efforts to formally recognise scicom, beyond agricultural communication, as a distinct discipline. In 1988, Jamias proposed a scicom program with a threefold aim to: (1) promote science literacy; (2) promote science for human development; and (3) promote public understanding of science (Jamias, 1988). Although initial proposals gave emphasis to the agricultural sciences, it was clear in later proposals that scicom should also deal with other branches of science. The mid-1980s to mid-1990s proved to be a fruitful time to discuss scicom in devcom, as three scicom workshops happened in this decade. On 11–12 April 1985, a department-wide workshop on scientific communication was held. On 11–12 July 1989, a UNESCO-funded workshop explored the institution of a national academic program in science information. On 10–11 November 1993, a national scicom conference was held to 'flesh out the conceptual foundations for the science communication program' program' (Gomez, 1993, p. 3). This conference resulted in the establishment of the now-defunct Philippine Foundation of Science Communicators, Inc. (Montemayor, 2018).

During the early 1990s, several undergraduate courses in scicom were institutionalised, paving the way for the first undergraduate devcom batches to have a major degree in science communication. When the institute became an autonomous college in 1998, the Department of Science Communication was established, and the College of Development Communication (CDC)

5 For example, the then Asian Institute of Journalism (AIJ) created a course guide in science journalism in 1983. Velasco (1998) noted that, along with AIJ, many other universities—most of them located in Manila—already had scicom-related undergraduate courses during the time of her study, some of them have instituted scicom-related courses as early as the 1980s.

became the first to offer a clear scicom academic track among all universities in the country (Velasco, 1998). Since then, the CDC's Department of Science Communication has organised roundtable discussions on scicom, institutionalised additional scicom courses and collaborated with institutions in scicom activities. In a bid to further increase the capacity for S&T communication, DOST partnered with UPLB in 2016 to launch the first off-campus scholarship in Master of Science in Development Communication for its communication specialists.

CDC has recently opted to have a generalist orientation in its undergraduate curriculum, with all students taking scicom courses. Although other higher education institutions had incorporated scicom in some of their communication courses years ago, it was only in 2017 that the Commission on Higher Education (CHED) required all higher academic institutions offering devcom to include 'Risk, Disaster, and Humanitarian Communication' in their curriculum, and to add at least two scicom-related courses in their respective units, as mandated in CHED Memorandum Order No. 36, s. 2017 (Commission on Higher Education, 2017). The courses resemble the scicom courses in UPLB, where theory and skills on communicating science using participatory approaches and various media (including online platforms) to four publics—scientists, technicians, policymakers, and the general non-expert public—are emphasised.

Other universities are developing their own scicom-related courses beyond the scope of devcom, by following a transdisciplinary format. For example, Ateneo de Manila University's life sciences program has a new communications track that trains students to effectively engage the public in biological discussions across multimedia platforms. Its revamped communication program is offering 'Science and Risk Communication' as a core course, as well as an elective integrating philosophy and sociology to critically appraise the field of scicom. The De La Salle University is developing a minor in science communication for its organisational communication program, while the University of the Philippines Diliman campus is offering classes in science journalism and hopes to soon offer a corresponding undergraduate degree program (Dimacali, 2017).

While a majority of these newer initiatives are located within Manila, the strategic placement of devcom programs across the Philippines' three major islands assures the growth of scicom scholarship. They now contribute to a growing body of research on diverse issues relevant to Philippine society, like new strategies for the communication of health and environmental topics (including emerging tropical diseases, climate change and disasters) and evaluations of the effectiveness of these scicom initiatives.

Figure 28.1: Gabriela party representatives lead Dengvaxia-vaccinated children and their parents in a protest in front of the Department of Health's Manila office.

Source: Christian Yamzon, Defend Job Philippines (used with permission).

7. Case studies in Philippine science communication

7.1. Agriculture: Biotech crops

The introduction of the first biotech crop, Bt corn, in the Philippines in 2002 was a contentious process. Technological issues merged with religious, political, social and cultural issues, resulting in years of drama—like the uprooting of field trials, hunger strikes, boycotts and fearmongering in the media. These events were a baptism of fire for the science community, science communicators and government officials who had to deal with a diverse group of stakeholders from civil society groups, priests and nuns, and even politicians who all had something to say on the topic.

A multi-sectoral coalition of biotech advocates was set-up: scientists were suddenly asked to articulate the benefits to farmers in public fora; communications people were briefed on crop biology to respond to safety issues; and even bishops and priests were engaged in dialogue to understand

their ethical concerns. This unfolding drama galvanised the combined efforts of the scientific community, science communication staff, media practitioners and other stakeholders to draw up a strategy to address a myriad of concerns and information requirements (Navarro et al., 2007; Panopio and Navarro, 2011).

Many initiatives were conducted by various government (DA, DOST, and UPLB) and non-government agencies (Biotechnology Information Center), farmers groups and private groups. These included dialogues with different stakeholders, creating field champions from the farming and local sectors and training the academic and scientific community to be actively involved in public briefings and engagement. Institutes inked a memorandum of understanding with PSciJourn to help establish a core of science writers from the different media platforms. Intensive media workshops, field visits and arranged interviews with scientists, farmers and local leaders were organised. Core experts who agreed to be key sources of information were trained on how to communicate for the layperson and engage in meaningful dialogue. Information briefs, story leads, event and institutional visits and identified experts were constantly given to the media practitioners in response to a perceived lack of 'interesting' pegs.

Farmers' acceptance and planting of Bt corn did not stop a similar process with the introduction of a second biotech product, Bt eggplant. Again, several challenges emerged, notably the premature termination of field trials because of the anti-biotech stance of local government and civil society groups. More damaging was the Supreme Court ruling in 2015 against further field trials based on a petition of civil society groups. Ironically, this event only heightened public awareness and interest in biotechnology and revitalised public dialogues and media articles. Eventually, the Supreme Court reversed its previous ruling, and science and industry have high hopes for its eventual commercial release (De Guzman, 2016). This time, the lessons learned from the first foray into biotech communication contributed to a more cohesive plan for public participation and engagement.

Interface with media and its outcome during this time may be validated by a 17-year media monitoring study by Navarro et al. (2011) and updated by Tome et al. (2017), which revealed a gradual progression of editorial perspective on Bt crops from a negative to neutral or positive tone over time. Uncertainty over the topic as well as lack of a tangible biotech product hampered the release of factual articles and opened the gates for their speculative and fear-based counterparts. In the succeeding years, science news using credible sources have become the norm. Efforts by the government and private sectors to provide media training proved to have significant

impact as media practitioners now write about the topic on a regular basis, using less exaggerated metaphors and focusing on message frames relevant to consumers in general.

7.2. Disaster management: Typhoon Haiyan

Typhoon Haiyan (local name: Yolanda) was a landmark event of national significance that made the government and people realise the importance of science (and risk) communication. In November 2013, Haiyan made its first landfall in Guiuan, Northern Samar, with sustained winds of 315 kph (195 mph) and gusts up to 379 kph (235 mph), making it the strongest typhoon ever to make local landfall. Haiyan caused massive property damage, and significant human costs with about 6,300 dead and more than 28,000 injured (NDRRMC, 2014). Although some meteorologists claimed that these deaths were caused by the typhoon's unimaginable strength (Lagmay et al., 2015), several post-Haiyan analyses pointed out issues of interest to science communicators. Montemayor and Custodio (2014), in particular, described three problems that implicitly led to the widespread realisation of the role of scicom in everyday lives: (1) the public's (mis)understanding of the term 'storm surge';[6] (2) people's attitudes toward evacuation;[7] and (3) problems in institutional mechanisms in disaster mitigation.[8]

The Philippines has since seen notable improvements in scicom, especially in disaster reporting. For example, PAGASA finally formally translated 'storm surge' in Filipino as *daluyong bagyo*. Since then, storm surges have always been reported in media weather forecasts, and efforts to make other meteorological jargon more intelligible to the public have been consciously inserted in weather forecasts in subsequent typhoon events.[9]

6 Before Haiyan, the term was nearly non-existent in the consciousness of the ordinary, non-expert Filipino public. The argument was, had there been enough efforts to make the public understand the concept of a storm surge before the typhoon, casualties might have been reduced.

7 Many studies pointed out that people in the affected areas downplayed the early warnings and underestimated the strength of the typhoon. This still happened even though reports claimed that people in the affected areas had received evacuation training from their local governments, and that both the local and mainstream media had broadcast early warnings about the typhoon.

8 Studies had pointed out three problems that need to be addressed in disaster mitigation on the national scale: (1) poor disaster education given to local citizens; (2) lack of an efficient system in disseminating hazard information; and (3) lack of safe evacuation facilities.

9 Aside from Typhoon Haiyan, the experience brought about by Typhoon Ketsana (local name: Ondoy) in 2009, which flooded most of Metro Manila because of the unprecedented amount of rain it brought, and the release of the Metro Manila Earthquake Impact Reduction Study in 2010, which predicted the occurrence in the near future of a 7.2-magnitude earthquake in Manila and neighbouring areas, contributed to increasing scicom initiatives in the context of disasters.

7.3. Health: Yosi Kadiri and Dengvaxia

The DOH is mandated to guarantee equitable, sustainable and quality health for all Filipinos, especially the poor. Achieving this mandate is contingent on effective health promotion strategies. Currently, the DOH's campaigns typically involve door-to-door health promotion and dissemination of information, education and communication materials through traditional and digital media, coupled with catchy slogans.

One memorable effort is the anti-smoking campaign Yosi Kadiri [Smoke is Disgusting] in 1992. The campaign's centrepiece was the now-iconic mascot, a personification of the evils of smoking meant to counter the cool, masculine and handsome images of smokers cultivated by the tobacco industry, as exemplified by the Marlboro Man (Blanke, 2004). The mascot, along with anti-smoking messages and information, was plastered all over traditional media platforms and supplemented by billboards, stickers and comic books (Nieva, 2014). School visits and celebrity promotions further embedded the Yosi Kadiri's anti-smoking message in the national consciousness.

Yosi Kadiri had significant political impact, like the passage of the Tobacco Regulations Act in 2003. The law prohibited smoking in enclosed public places, banned the sales of cigarettes to minors and regulated cigarette advertisements. The Act paved the way for policies further restricting tobacco use, like the Sin Tax Reform Law that imposes higher taxes on tobacco products and the Graphical Health Warnings Law that stipulates that all tobacco products must carry graphic health warnings.

In contrast to Yosi Kadiri's success, the recent Dengvaxia immunisation program was a PR disaster, with stark consequences for the future of Philippine public health. Manufactured by Sanofi Pasteur, Dengvaxia is the world's first-ever dengue vaccine. Its sale was approved for the Philippines in December 2015. A mere four months later, a school-based immunisation program was launched by the DOH. The program would target over a million 9-year-old public school students in select regions of the Philippine island of Luzon.

In November 2017, Sanofi announced that Dengvaxia could cause 'severe dengue' in recipients who had never had the virus (termed 'seronegative patients'). At this point around 800,000 children had already been vaccinated, and 10 per cent of them were seronegative (CNN Philippines, 2018). The program was halted the following month, but sensationalised accounts of deaths started proliferating in national media, causing widespread panic and confusion (Figure 28.3). Local experts blamed the hysteria on Sanofi's lack of clarity on the term 'severe dengue'. Parents equated severe dengue

with dengue shock syndrome, a far deadlier complication characterised by massive bleeding (Takumi, 2017). Moreover, parental consent forms were later found to lack information on vaccine risks and potential adverse effects (Torregoza, 2018).

Although no causal link between Dengvaxia and the children's deaths has been established so far, the damage was done. Hospitals subsequently documented significant drops in children's general vaccination rates and accounts of parents refusing even the DOH deworming program due to fears of another Dengvaxia-like scenario have been reported (Pazzibugan and Aurelio, 2018). Both the DOH and Sanofi are now challenged to restore public trust in their immunisation program and in their institutions as a whole.[10]

7.4. Institutional experiences: IRRI and ISAAA

Philippine-based international organisations like the International Rice Research Institute (IRRI) and the International Service for the Acquisition of Agri-biotech Applications (ISAAA) continue to be led by Filipino scicom experts. While rice research is the core business of IRRI, it plays an important role in developing and implementing strategic communication plans and activities, along with coordinating communications for the Global Rice Science Partnership. There is still much to be done to get people to understand the potential for its projects—like the Green Super Rice project that aims to develop stable high-yield cultivars that use less water, fertilisers and pesticides (IRRI, 2018). Though the Golden Rice project is still in the R&D stage, IRRI has had to respond to occasional attacks against this GM product, as people raise the same perceived fears as they did against Bt corn and Bt eggplant. An important process has been the conduct of public consultations as an integral component of the national biosafety regulatory process in the Philippines.

10 Other public health concerns such as influenza A(H1N1) virus, meningococcemia, Zika, avian flu and MERS-CoV in the past several years also contributed to the advancement of scicom initiatives in the health sector.

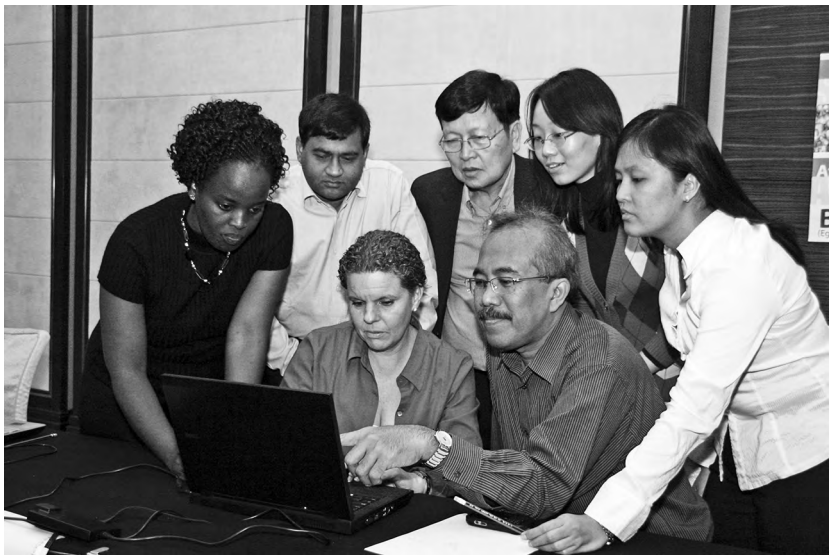

Figure 28.2: A group of science communicators from Africa and Asia assembled by ISAAA to help in knowledge-sharing initiatives in biotechnology.

Source: Eric John Azucena, ISAAA (used with permission).

ISAAA created a network of Biotechnology Information Centres in Asia, Africa and Latin America (Figure 28.4). A team of Filipinos transformed a proposal on knowledge sharing and science communication in 2000 into the Global Knowledge Center on Crop Biotechnology. These centres address communication challenges like bridging science and society (India), popularising genetic modification (China), understanding the saga of biotech papaya (Thailand), increasing biotech awareness for the masses (Malaysia) and strategising communication in biotech crop commercialisation (Bangladesh). Not only has scicom been institutionalised as a key component in the science arena but a cadre of scicom practitioners has also been developed (Navarro et al., 2013). A ripple effect for the appreciation and awareness of scicom in many countries began with home-grown Philippine initiatives.

8. Lessons learned, challenges in Philippine science communication and conclusion

Science communication had a slow start, but once it raised the interest of various stakeholders, it made a mark both locally and globally. There is now a core group of science communicators nurtured by an academic community and a thriving environment.

In a synthesis of different studies conducted by faculty members of UPLB's Department of Science Communication, Montemayor (2016) highlighted four good practices of different government and non-government agencies for scicom activities. Findings suggest that for a scicom initiative to be successful: (1) institutions should allot an adequate budget for their scicom activities to produce diverse outputs and achieve desired outcomes; (2) project teams should be composed of a mix of seasoned and young staff with smooth working relationships; (3) the scicom project should always have a unique selling point to establish its niche; and (4) the scicom project should receive strong support from top management.

Despite the idiosyncrasies brought on by the Philippine context, local scicom efforts continue to face similar challenges as their international counterparts (Navarro, 2018). While there are efforts to improve media coverage of science, particularly in the field of biotechnology, the research on both Filipino scientists (Ponce de Leon, 2011) and science journalists (Lacbayo, 2012) suggests the existence of a clash between the two groups, caused by a mutual lack of training and collaboration. The shared lack of formal scicom training was later attributed to the limited number of Philippine universities offering dedicated scicom classes and programs (Navarro, 2018). This has resulted in issues regarding the accuracy of science reporting in the media (Lacanilao, 2006). According to Ponce de Leon, Filipino scientists appear to subscribe to the outdated deficit model of scicom, affecting their communication approach to the public. The existence of a 'clash' between science and the media has long been debated, with surveys from the US (Hartz and Chappell, 1997) and Australia (Searle, 2013) suggesting the pervasiveness of this concept worldwide.

Challenges specific to Filipino science journalists include the absence of dedicated science reporters and experts in many newsrooms and low prominence of science stories in Philippine media (Congjuico, 2017). Due to rising costs in today's media landscape, even developed countries (Brumfiel, 2009; Ashwell, 2016) have had to contend with staff cuts and dwindling science news sections. The poor pay of Filipino journalists and limited access to funding hinders their search for science news leads and stories, further disincentivising the science beat and the science journalism career track.

Emerging scientific fields with their many issues have focused on developing a new form of public engagement that is more participative and dialogic. The number of actors involved in scicom is increasing, requiring new formats and modes of communication. Though a survey showed that while most Filipino scientists and academics strongly agree that they have a responsibility to communicate with the public, only 10 per cent of their time was devoted

to this (Tome et al., 2014). Some 20 per cent have attended risk communication workshops. One major communication barrier is the difficulty of translating technical concepts into layperson's terms, and another is dealing with audiences with negative views about a scientific issue. Scientists felt that organisational support for scicom initiatives and establishing a community of practice would change mindsets.

To date, the reach of scicom efforts in the Philippines is viewed as insufficient by some practitioners (Navarro, 2018). This may be caused by barriers to access such as socioeconomic status, geography and language. One-fourth of the population live below the poverty line, potentially causing limited access to media-centric scicom efforts. Exacerbating this situation is the geographic spread of the population over the islands, making it a continuous challenge for science communicators to reach out to remote, poorly serviced and impoverished regions outside major metropolitan areas. The fragmented geography of the Philippines also introduces linguistic challenges, as various regions have distinct cultures and languages and there are approximately 180 different languages over the country (Simons and Fennig, 2018). For local scicom to be truly inclusive, future efforts must adapt to these factors or risk excluding a significant proportion of the population.

Although local scicom initiatives are still dominated by information delivery models (Brossard and Lewenstein, 2010), scicom initiatives guided by lay expertise and public engagement models are being carried out in the field, depending on the nature of the science topic to communicate, and the amount and source of project funding. It is hoped that more scicom initiatives in the future will focus on public engagement (Montemayor, 2016), and these challenges highlight the opportunities for growth in scicom. Navarro and Hautea (2011) listed the challenges to include capacity-building programs for different stakeholders; communication research to validate assumptions; identifying appropriate strategies to monitor and evaluate impact; developing a more responsive and relevant curriculum in secondary and tertiary education; and institutionalising the field in government and private sector initiatives.

Dr Gelia Castillo, a Philippine national scientist, has said that times have changed with different stakeholders now asserting their rights to know and participate in science-related decisions that affect their lives (Castillo, 2003). In the Philippines, it is no longer a case of science then communication but science communication.

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Timeline

Event	Name	Date	Comment
First interactive science centre established.	Philippine Science Centrum	1984	Private sector initiative with support from the Department of Science and Technology
First national (or large regional) science festival.		1951	Occurred during National Science Week
An association of science writers or journalists or communicators established.	Philippine Science Journalists Association (PsciJourn)	2001	
First university courses to train science communicators.		1960	Offered by the University of the Philippines College of Agriculture
First national conference in science communication.		1993	One of the first conferences resulted in the establishment of the Philippine Foundation of Science Communicators, Inc (PhilSciCom)
National government program to support science communication established.	Science and Technology Information Institute of the Department of Science and Technology	1987	
National Science Week founded.		1951	
First significant radio programs on science.	Science topics were discussed in *Mga Gintong Kaalaman* [Bits of Golden Knowledge]	1965	Hosted by Ernie Baron, a general radio program
First significant TV programs on science.	*Sineskwela* [School on Air]. May not be the earliest, but definitely the most popular science program	1994	Jointly produced by the ABS-CBN Foundation, the Department of Science and Technology, and Department of Education, Culture and Sports
First awards for scientists or journalists or others for science communication.	Annual Department of Science and Technology Media Awards	1988	
Other significant events.	First Youth Science Camp with Science Journalism workshop	1971	Through the Science Foundation of the Philippines

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