SCIENCE IN PALESTINE

WORKING UNDER DIFFICULT CIRCUMSTANCES, THE PALESTINE ACADEMY FOR SCIENCE AND TECHNOLOGY (PALAST) HAS NEVERTHELESS MANAGED TO TAKE A NUMBER OF NOTEWORTHY STEPS TO PROMOTE SCIENTIFIC TRAINING AND RESEARCH. PALAST'S ULTIMATE AIM IS TO STRENGTHEN BOTH THE SCIENTIFIC COMMUNITY AND THE PROSPECTS FOR SCIENCE-BASED DEVELOPMENT IN PALESTINE.

Imagine a scientific organization operating under forbidding conditions marked by relentless political instability, economic distress and social tension.

Now imagine this organization arduously moving forward, despite limited funds, unyielding isolation and even the ransacking of its offices.

Such incongruous circumstances accurately describe the brief history of the Palestine Academy for Science and Technology (PALAST), which was established in 1992 by the Palestine Liberation Organization (PLO) as an independent, non-governmental public agency.

The Palestinian Authority deemed PALAST its foremost scientific and technological "coordinating" agency and granted the Academy a leading role in fostering scientific capacity building and exchange. Specifically, PALAST's mandate focuses on defining Palestinian science priorities, advancing scientific and technological research through cooperation, promoting innovation, and fostering applications of science and technology for the benefit of society. Academy members, currently totalling 45, are among Palestine's most distinguished scientists.

SCIENCE SURVIVAL

Established just one year before the signing of the Oslo Accords in 1993, PALAST was inactive until 1997, when a presidential decree officially confirmed its status and assigned the Academy strategic tasks for advancing scientific research and promoting innovation in Palestine.

PALAST opened its first office in Ramallah on the West Bank in 1998 and a second office in Gaza in 2000. A third office in East Jerusalem serves as the Academy's headquarters.

Two years later, PALAST's staff and members were shaken and dismayed when Israeli soldiers pillaged the Academy's office in Ramallah.

As Imad Khatib, Secretary General of PALAST, recalls: "The deliberate targeting of scientific institutions, including PALAST offices in Ramallah, often forced us to work at home. A lack of funds, moreover, handicapped our efforts."

The Academy, he says, has received little financial backing from the Palestinian Authority to conduct research activities. "From 2001 to 2004, Academy staff worked on a voluntary basis. Such obstacles," he is quick to add, "while discouraging, have never stopped us from pursuing our goals."

PALAST functions as a crucible for scientific collaboration.

Since then, PALAST has literally emerged from the chaos and debris to become a focal point of scientific activity in Palestine as well as a respected member of the international scientific community. In 2004, a second presidential decree reaffirmed its status as an independent, non-governmental public body.

FIGHTING FOR SCIENCE

What is it like to operate in a war zone? There is fear and tension, and constant worry about being caught in the wrong place at the wrong time. There is irritation and annoyance created by checkpoints and detours imposed by the Israeli forces. There is dreariness and frustration due to a lack of funds and continual isolation. There is violence, sometimes deadly. Yet life goes on.

As PALAST member Radwan Barakat, a plant pathologist and dean of academic research at the University of Hebron, observes: "While it has not been easy, I have continued to conduct research on the biological control of plant diseases as an environmentally safe alternative to the use of agrochemicals."

"I have often had limited access to the scientific literature and laboratory materials," he continues. "My ability to move from place to place, moreover, has been severely constrained. From time to time, my university has even been forced to shut down." In 2003, during one of these closures, Barakat and his colleagues hopped the walls and slipped into the laboratory through the backdoor to water the plants that were essential to their research.

Science struggled but never succumbed to the disheartening circumstances in Palestine. With more than 40 universities, colleges and research institutions serving over 150,000 students, science in Palestine spans a full spectrum of fields that ranges from medicine to water management and from environmental studies to engineering.

"We know that research efforts need to focus on such critical societal concerns as water and soil management, agricultural productivity, public health, energy and desertification," notes Khatib. "Fortunately, Palestinian scientists are conducting research in these and other areas."

"One of the critical roles of PALAST," he adds, "is to help boost the impact of these research efforts by strengthening coordination among individual scientists and scientific institutions and by cultivating ideas and lending support to initiatives that arise from

research and have commercial potential. With limited resources, it is also essential that we avoid duplicating each others' efforts."

PALAST has forged connections with a broad range of national and international institutions that support scientific and technological capacity building, especially in the developing world. These institutions have included IAP, the global network of science academies, and the InterAcademy Medical Panel (IAMP) in Trieste (organizations that work closely with TWAS), the European Union (EU) and the US National Academy of Sciences (NAS).

PALAST does not do research on its own. This is the responsibility of Palestine's universities, colleges and research centres. True to its mandate as a coordinating agency, however, the Academy functions as a crucible for scientific collaboration, Khatib notes, "both in Palestine and between Palestine and the global scientific community."

ON THEIR OWN

Palestinians recognize the value of higher education in their efforts to improve social and economic conditions. However, creating quality institutions of higher education has not been easy given the difficult – some would say, debilitating – political and economic conditions that have prevailed in Palestine for decades.

To assess the situation and develop a strategic plan of action, PALAST, with funds from the British Foreign Department Fund, organized a series of meetings in Ramallah and Gaza in 2001, attended by representatives from government ministries, universities, research centres and stakeholders both in the private and in the public sector. Attendees met to discuss the obstacles that were impeding progress in scientific capacity building and science-based development, and to examine and discuss potential strategies for future success.

The plan included three distinct scenarios that could potentially have a direct bearing on the range of activities under which PALAST could operate.

The first and most optimistic scenario envisioned an environment in which political stability prevailed and the Academy received adequate funding from the

government. The second scenario envisioned political stability but insecure government support. And the third scenario envisioned continual political turmoil and scarce government funding. Unfortunately, it is the third scenario that most resembles reality.

One year after laying out these scenarios, PALAST published the results of a survey on the state of scientific research in Palestine. The survey was intended not only to provide a snapshot of current conditions but also to serve as a baseline for measuring the impacts of subsequent actions.

Survey findings called attention to the lack of both political and financial stability as a major impediment to scientific research. Indeed more than half of the institutions participating in the survey said that they did not receive any government funding for research. Funds from foreign donors, they noted, represented the main – and, in many instances, the only – source of money for research.

While grateful for the assistance from benefactors outside of Palestine, survey participants observed that most research agendas, not surprisingly, were largely shaped by the donors, and that the agendas of the donors sometimes differed from their own. In addition, survey participants observed that fierce competition for external funds tended to impede cooperation among Palestine's scientific institutions.

In addition to providing insights into the prevailing attitudes of researchers, the survey generated a wealth of facts and figures that has enabled PALAST to assemble a database of Palestine's scientific institutions comprised of information about the staff, equipment and research activities. "The data base," Khatib observes, "has helped to spur the creation of networks based on shared interests and complementary strengths. It's been an excellent resource for fostering collaboration among our scientific institutions."

One goal of PALAST has been to instil a sense of normality into the affairs of scientists.

For example, working closely with the Palestinian Ministry of Health and the Palestinian Red Crescent Society, PALAST helped to improve treatment for dia-

WATER DIVIDES

Imad Khatib notes that Palestine "needs to pay special attention to its serious water problems," and in 2009, it participated in a series of initiatives to address this issue. For example, the Academy joined with the Palestinian Water Authority in organizing the Second International Conference on Water Values, which was co-sponsored with funding by the United Nations Development Programme (UNDP). International experts, decision makers, scholars and stakeholders participated in the event. Discussions focused on water and wastewater management and water rights within the regional context in which the water is distributed. According to local experts, Palestine's water resources should be sufficient to meet future demand, but only if measures are put in place to ensure the more equitable sharing of these resources with Israel, and only if Palestine pursues policies that increase the efficiency of water distribution and use. "Research," says Khatib, "could be crucial to these efforts" by, for example, improving irrigation techniques, curbing water pipeline losses, helping to develop state-of-the-art technologies for desalinization and implementing effective programmes for wastewater treatment. For additional information about the Palestine Academy of Science and Technology, see: www.palestineacademy.org.

betes through more reliable and consistent medical care and the distribution of insulin to growing segments of the affected population. Another important PALAST-led public health initiative has encouraged efforts to curb micronutrient deficiencies among infants and adolescents through greater access to iodine-fortified table salt and wheat. Both efforts required a level of coordination that reaches well beyond the scientific and medical communities.

MEETINGS MATTER

Conferences and workshops are the lifeblood of science in countries with vibrant scientific communities that are fully knitted into the country's political and social fabric and are active members of the international scientific community. But in Palestine, political tensions, limited resources, restrictions on movement, and the potential for violence have often made it difficult for Palestinian scientists to meet and exchange information and ideas on a regular basis. The "security wall" built by Israel, for example, cuts through Al-Quds University in Jerusalem, forcing faculty and students to take hour-long detours to move across the campus.

One of the goals of PALAST has been to instil a sense of normality into the affairs of scientists by sponsoring conferences and workshops. These efforts have usually been funded by outside donors and have thus carried the added value of promoting international exchange. But such sponsorship has also engendered concerns that support for science is greater outside Palestine than inside.

With funds from the EU, in 2003, PALAST participated in a conference exploring potential strategies for forging scientific co-operation with EU member states



and Mediterranean partner countries. In 2004, it joined an EU project designed to promote innovative environmental management, especially among small- and medium-sized industries. In 2006, PALAST participated in a series of EU-sponsored multi-lateral conferences examining ways for Palestine to participate in the EU's 7th Framework Programme. And in 2007, PALAST, again with EU support, participated in a conference to develop a research agenda for strengthening Palestine's information and communications infrastructure, especially for improving environmental management and promoting innovation. Another EU-funded conference focused on water management research issues.

With financing from the US National Academy of Sciences, PALAST has held workshops and conferences and issued reports on a number of critical issues, including biodiversity, nutrition and regional water issues.

Members of PALAST have never lost hope for a better future.

And with funds from the German Ministry of Education and Research (BMBF), PALAST has led the efforts to create climate change scenarios for the GLOWA-Jordan River project, as part of the Global Change of Hydrology Cycle programme.

GLOWA has five large cluster projects: two in Germany and three in Africa. The projects focus on such climate-related themes as natural and human-induced variability in rainfall and the intricate relationships between hydrological cycles, the biosphere and the land use.

PALAST has also engaged in less conventional research efforts, again with support from external sources. For example, in a project funded by *Un Punto Macrobiotico* in Italy, in late 2009, the Academy organized a workshop on the use of organic food to treat diabetes type 2 that was held at the Red Crescent headquarters in Ramallah.

EDUCATION FOR ALL

In addition to its efforts to promote research on critical scientific issues, PALAST also seeks to promote science education, especially among students, and to foster public appreciation for science, particularly among adults.

One of its most noteworthy efforts has been its support for an environmental centre in the Jericho Governorate, a political jurisdiction with some 32,000 residents located on the West Bank just north of the Dead Sea. The centre is designed to teach visitors about the region's ecology and biodiversity. It contains a fossil exhibit, a computer centre and even a camp site. The centre serves as an unconventional classroom and field laboratory both for students and researchers, providing a wide range of educational and research opportunities. In addition, PALAST has also played a central role in the creation of a natural history museum in Tal Al-Hawa in Gaza.

FUTURE CHALLENGES

The Academy has prepared an action plan for 2008-2013 that is designed to provide a broad framework for building a system of science, technology and innovation. The goal is to more fully integrate science into

society and to enhance the role of science in Palestine's economic development efforts. The plan calls for strengthening scientific institutions, promoting scientific networks and encouraging the private sector to invest in research. While acknowledging the long-standing struggles in the region, the strategy nevertheless strikes an optimistic plea for "more breakthroughs amidst surviving the abnormal".

All of this, of course, will necessitate money and greater efforts to link science to innovation by forging closer cooperation between the scientific community and society.

That is why, for a number of years, PALAST has pushed for the creation of a science fund that would help coordinate investments in science throughout Palestine. The primary objectives of such a fund would include the creation of better management systems, the promotion of partnerships and networks, and the exploration of opportunities for advancing cutting-edge science and technology. "The fund," says Khatib, "would help direct scientific research to the needs of society."

Over the course of the past decade, PALAST has overcome enormous obstacles to emerge as an active and well-respected organization, and it has gained the admiration of political leaders both at home and among bi-lateral and international organizations abroad. The Academy has developed a wide-ranging portfolio of activities for the promotion of scientific research and training that has contributed in important ways to Palestinian society.

Despite facing extraordinarily difficult circumstances, Khatib says that members of PALAST have never "lost hope for a better future." Such life-affirming persistence in the face of adversity remains an important measure of the Academy's success. ■