Israeli-Palestinian Science Organization

IPSO

www.ipso-jerusalem.org

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7th July, 2011

Mr. Max Angerholzer
Executive Director
The Richard Lounsbery Foundation
Washington. DC
U.S.A.

Dear Friends,

The proposal before you is being submitted in the belief that the work of the Israeli-Palestinian Science Organization (IPSO) has great significance and potential, both in helping outstanding scientists carry out research that would otherwise remain dormant and in creating an atmosphere conducive to peace in a troubled part of the world. Right now, IPSO is in need of a springboard from which to launch a renewed effort, and the grant being applied for herewith would provide precisely such a springboard.

As described in the proposal IPSO's record thus far provides, we believe, solid evidence of our organization's ability to cope with the challenges being outlined in the proposal and to deliver outcomes that meet very high standards of excellence.

We are most grateful to the Richard Lounsbery Foundation for considering this application.

Sincerely,

Sari Nusseibeh Torsten N. Wiesel Menahem E. Yaari

Operating Support for IPSO Research Projects
A Proposal Submitted to the Richard Lounsbery Foundation
July 2011

It is our great privilege to resubmit a request to extend your support of the Israeli-Palestinian Science Organization (IPSO). IPSO very much appreciates the core support the Lounsbery Foundation has provided IPSO since 2006, without which we would not have been able to support almost two dozen joint research projects between Israeli and Palestinian scientists.

We are requesting $75,000 a year over three years (for a total of $225,000) to help underwrite the operating costs of the Israel-Palestinian Science Organization (IPSO). This would include office rent, utilities and supplies, modest staff stipends, as well as necessary fundraising funds.

The IPSO Mission Statement, drafted by Prof. Sari Nusseibeh and Prof. Menahem Yaari, and endorsed by its International Scientific Council (ISC) sets the goals for IPSO:

*The proposed **Israeli-Palestinian Science Organization (IPSO)** shall be dedicated to the following goals:*

a. *promoting high-quality research and advanced training in all areas of science and learning;*
b. *creating a science-based bridge of good will between Israelis and Palestinians;*
c. *identifying areas of science where cooperation between Israelis and Palestinians would be feasible and productive;*
d. *creating conditions for Israeli and Palestinian scholars and scientists to meet and to establish dialogue;*
e. *promoting Israeli-Palestinian cooperation in Science Education.*

When IPSO was conceived, during the second Intifada, the prospects of serious cooperation between Israeli and Palestinian scholars and scientists were uncertain. However, the founders of IPSO, Prof. Torsten Wiesel (Nobel Laureate in Medicine and former President of Rockefeller University, New-York), Prof. Menahem Yaari (until October 2010 President of the Israel Academy of Sciences and Humanities), and Prof. Sari Nusseibeh (President of Al-Quds University), believed that the universality of scientific language, would help make the mission statement a reality. There would be scientific cooperation between Israelis and Palestinians which would not only contribute to scientific capacity building, but also encourage dialogue and better mutual understanding and recognition.

Since its establishment, IPSO has received approximately 150 proposals. Some 45 were deemed worthy of funding, following the peer-review process by members of our International Scientific Council (ISC) who were very involved, by personally reviewing proposals, and sometimes directing proposals to other distinguished scientists, when the

proposals were outside of their fields of scholarship. We have thus far funded 20 research projects, amounting to $2.8 million, with many success stories.

IPSO has proved that it can facilitate the meeting of Israeli and Palestinian scientists for joint research, even during the worst days of conflict. IPSO's offices close to both East and West Jerusalem were, in the past, a meeting place for scientists, and after necessary renovations are again becoming a hub of activities.

IPSO has proven capable of not only receiving proposals initiated by scientists, but of strategically initiating projects in fields deemed necessary for Palestinian society, its higher education, social welfare and economy, and for a better dialogue between scientists of both peoples. We have proven and are currently proving that some of the best Israeli scientists were and are willing to cooperate with Palestinian scientists in joint theoretical, applied and developmental research, as well as in coaching junior Palestinian scientists, These successes, presented below, encourage our continued efforts to launch a new call for proposals and initiate projects in priority areas, and reinforce our belief that increased funding can achieve even better results.

The First Nano-Science Lab in Palestine and the Arab Middle-East

Danny Porath, a young but senior Israeli chemist, heads a research group at his laboratory at the Hebrew University of Jerusalem (HUJI), and has cooperated with Mukhles Sowwan, an even younger Palestinian chemist from Al-Quds University (AQU), who received his Ph.D. from HUJI, and then joined Porath's laboratory for a post-doctorate.

This project is achieving cutting-edge science and close cooperation, and has also enabled Sowwan to establish his own nanotechnology laboratory at AQU – the first of its kind in Palestine which is developing a cadre of young researchers who are studying in Israel and France. The cooperation expanded to trilateral projects with Taiwan, and this year Dr. Sowwan was hosted at Stanford University. The project was partially funded by French government grants and partially by an anonymous French donor through his foundation in the USA.

Porath and Sowwan exemplify an important principle adopted by IPSO: in many cases, such cooperation between Israelis and Palestinians should not only be an individual effort by the principal investigators, but should also lead to strategic development of new or substantially upgraded departments in Palestinian universities. We are now seeking funding for a second project in the nano-sciences that would include additional Israeli and Palestinian scientists.

Pharmacology: Searching for Effective Drugs for Leukemia

If successful, this research will contribute to the development of a drug for certain types of leukemia. The research involves theory and experimentation, scientific innovation and prospects for profit through patents. The framework resembles the nano-science laboratory

framework: a senior Israeli scientist, Dr. Amiram Goldblum of HUJI, has cooperated with a junior Palestinian scientist, Dr. Yousef Najajreh of AQU, who is developing a new laboratory and a research team, and with Dr. Jamal Mahajneh, an Israeli Palestinian from the Migal Research Institute in the Galilee. This project is a good example of IPSO launching and supporting cooperation which then becomes independent. The team has already obtained a five-year grant from the German National Foundation of Science (DFG).

Genetics: Reducing Genetic Disorders Among Palestinian Children

Genetics is another field of strategic IPSO funding. There is approximately a 45% rate of consanguinity (marriage in the family) in Palestine's Muslim population which consequently increases the number of genetic disorders. The cooperation involves an outstanding Israeli micro-biologist, a principal investigator from the Weizmann Institute, Dr. Doron Lancet, his senior Palestinian counterpart, Dr. Moein Kanaan, of the University of Bethlehem, and the Children's Cardiology Department of the Israeli Wolfson Medical Center—which receives referrals of Palestinian children with congenital heart disease through Palestinian physicians in the West Bank and Gaza. IPSO also prepared a comprehensive cooperative plan for the development of Palestinian infrastructures for both services and research on the Palestinian side, including the prospect of fostering wide-scale, pioneering research. The plan was presented to the former Director of the US National Institute of Health (NIH), Dr. Elias Zerhouni, and funding possibilities have been discussed with him. We have received seed money from NIH, and two Micro-array systems from Affymetrix Ltd, the leading American innovator and producer of genetic research equipment, which enables the Palestinian laboratory to perform state-of-the-art analyses after training in the Weizmann Institute laboratories. Our challenges are cutting edge scientific achievements combined with increased and improved genetic counseling in Palestinian communities, leading to the reduction of genetic disorders among Muslim Palestinians and in the Muslim world at large.

Preventing Desertification of Dunes

Another strategically important research addresses the prevention of the desertification of dunes, close to and within the Gaza Strip. Some of these lands in Israel have been mentioned as potential future swaps for a peace settlement with the Palestinian Authority. Despite the current difficulties, a Palestinian researcher from Gaza, Dr. Jamal Safi from the Environmental Protection and Research Institute in the Gaza Strip, continues to work with his Israeli counterpart, Dr. Aaron Kaplan from the Arid Ecosystems Research Centre at the HUJI.

Water, Environment and Agriculture

An IPSO initiative led to a grant from the Region of Tuscany, Italy to address issues of small waste-water treatment systems in rural communities, mostly in Palestinian villages. The objective is to learn about the systems' potential to prevent soil and aquifer pollution, and examine which crops can be grown if irrigated with the waste-water treatment systems. A

comprehensive report of the two principal investigators, Dr. Mustafa Khamis of AQU, and Dr. Rafael Carel of the University of Haifa, will recommend solutions for some 200 small, hilly Palestinian communities in the West Bank, that need low-cost, low-energy, easily maintainable systems. In a related agricultural project, the genetic improvement of chickpeas, which is a basic staple in Palestine, has been studied, as well as the irrigation of the crop with treated waste water. Dr. Khamis and Dr. Shahal Abbo from the Faculty of Agriculture of the HUJI are eager to continue and a second phase is now anticipated.

Physical Anthropology: The Sources of Violence in Pre-Historic Times

The Alfred P. Sloan Foundation funded a most successful research in Physical Anthropology and Medical Archeology that examined pre-historic skeletons to learn how people were killed during the agriculture revolution, approximately 10,000-8000 BC, so as to understand the roots of human violence, assuming that the agriculture revolution was a turning point in human dominance and aggressive behavior. The project included mentoring a Palestinian Ph.D. student, Issa Sarieh, who is now a Ph.D. by a senior Israeli scholar, Dr. Israel Hershkovitz of the Tel Aviv University School of Medicine in mastering the methodology of skeleton analysis. The two researchers jointly submitted two papers to peer-reviewed journals.

Dr. Jesse H. Ausubel and Mr. Doron Weber, the current vice-presidents for Programs of the Sloan Foundation, extended much support and encouragement.

Harnessing history to understand water conflicts in the Jordan Basin

This successful, innovative, multi-research, multi-disciplinary project addresses a research field that has barely been studied in our region, and only recently studied everywhere else as well. Several parallel and joint studies of key water issues in the region in the last 100-150 years are involved, There is also an IPSO water history website with oral history materials based on interviews with experts, scholars and decision makers, who are mostly retired, and store in their memory and personal papers a wealth of information.

The progress of this project was first presented at the Conference of the International Water History Association (IWHA) in June 2010. IPSO had two long sessions with seven IPSO presentations, and a one-day conference will be held in Jerusalem, in September 2011, to present our findings to a wider audience of Israeli, Palestinian and international scholars. In 2012, the studies will be published in a special issue of the peer-reviewed *Water History*. UNESCO funds this pioneer project; fund-raising for an extension is going strong.

Improving Science Education in Palestine: An action research

IPSO is making a difference in Science Education, with an R&D focus. IPSO became involved when it was invited to join an Israeli-Palestinian project to cooperatively develop a Science Education Center at the Palestinian AQU. IPSO implemented a pilot, a *Multi-cultural and Multi-lingual Website for Science Education*, a first package of web-based

educational materials that will soon be uploaded on IPSO's new website, and UNESCO's Science Policy Division website. With the accumulated experience and the capacity building achieved, IPSO is now planning a project to develop a full-fledged educational website of learning units and materials for teachers. Here again strategic thinking guides detailed planning. The goal is to foster teachers' development with the support of web-based curricula materials in sciences and mathematics, and to increase the Palestinian teams' capacity to develop such materials. The project will be framed as an action research. Partners include the Hebrew University of Jerusalem, the Weizmann Institute, Al-Quds University, and the French Academy of Sciences project, *La main à la pâte.*

Advancing Cooperative Research in Conflict Areas: A recent conference

On June 2-5, 2011, IPSO co-organized a conference in Cyprus, with the North Carolina-based Research Triangle International (RTI), the Israeli Sapir College, located 3 miles from the Gaza Strip (and targeted several times by rockets from Gaza), and the Cyprus Institute (CyI). *Advancing Research and Science in Conflict Areas* was enabled by a Richard Lounsbery Foundation grant to Sapir College. The conference was originally scheduled for early-2009, but was delayed following the war in Gaza, and was facilitated through IPSO's capacity to convene academicians: a dozen Palestinians researchers and a dozen Israelis who worked jointly for three days to plan future research.

The title of the conference encapsulated its major objective: the discussions led to ideas and pragmatic outlines of new cooperative projects, including the review of potential funders. Four research topics were outlined in Water, four in Public Health and Post-Trauma, and one multi-project was outlined in Science Education.

Pre-conference communication between participants, with IPSO as initiator, matchmaker, and facilitator was very helpful; detailed proposals are already being developed, and the first proposal will already be submitted in July.

The conference was held at the CyI which involved the Cypriots, as well as several of their international fellows, paving the way for the expansion of IPSO's activities with EU and non-EU Mediterranean scientists. The professional and friendly IPSO-CyI ties made it possible to hold the conference in Cyprus, with the Minister of Education and Higher Education of Cyprus (a cognitive psychology professor) opening the first session, and the President of the Institute. Dr. Costas Papanicolas (a nuclear physicist) very much involved as well.

IPSO offices

The previous RLF grant allowed us to rent an office in line with ISC instructions—close to both East and West Jerusalem, i.e., easily accessible for Israeli and Palestinian scientists to reach across the divide, and neutral symbolically. It took us time to find this location, because of the scarcity of office buildings in these neighborhoods as they are in high demand by other NGOs, consulates and international organizations. For the first two years we rented a private apartment

opposite the offices of the Delegation of the European Union to the Palestinian Authority, with easy access for Israelis and Palestinians. Unfortunately, our landlord decided that he was no longer interested in renting the space to an NGO.

After months of searching we found office space in an office building on the East Jerusalem (Palestinian) side, strategically located near the American Colony Hotel. Its renovation was paid from the money saved while we were office-hunting and working from home.

IPSO now has an adequately equipped office, with a meeting room which hosts researchers' meetings and cooperative workshops. This space is extremely helpful, enabling IPSO to convene workshops, seminars and team meetings.

Fall 2011 Initiatives

IPSO's successes were not, and are still not, easy to achieve. Since its inception, IPSO has struggled against the difficulties of the second Intifada, a stalled peace process, the second Lebanon War, the rising power of Hamas and its taking over Gaza, the war in Gaza, and once again, the stalled peace process. Sadly, these events empowered forces within the Palestinian Authority that support the academic boycott of Israel and caused delays in starting new projects with the Israelis.

The skies of Palestine and Israel are still clouded, but IPSO's Board decided, in December 2010, to invigorate its fundraising effort, so as to launch a new call for proposals. It will include *inter-alia*:

- A public event at UNESCO's headquarters in Paris, in the spring of 2012, during and parallel with UNESCO's Executive Council. This will be a joint initiative of UNESCO and IPSO, to create an opportunity for UNESCO to present IPSO as a model of cooperation in science in areas of conflict, thereby exemplifying the mission of UNESCO (and IPSO) to foster Science for Peace. The choice of time and venue will hopefully increase IPSOs visibility. At the same time, UNESCO will host IPSO's Board meeting – its International Scientific Council.
- A similar event in Budapest in mid-November 2011, will be held at the World Science Forum, which celebrates its 10th anniversary this year. IPSO will present some of its successful projects.

- Following preliminary talks with Dr. Peter Agre who is a member of our ISC, Dr. Alan Leshner and Dr. Vaughan Turekian, we are also looking forward to cooperating with the AAAS in a jointly organized seminar in Washington DC, to exemplify science diplomacy at its best, convening Congress members, donors, and other influential groups.

  In its fundraising efforts, IPSO will approach several foundations, individuals, and government departments. Evident examples are UNESCO, the Department of State, NSF and NIH, as well several foundations as in the US, and in Europe, the European Union, the nascent Union for the Mediterranean, the DFG and the Ministry of Education of

Germany (BMBF), the Riksbank Foundation in Sweden, and members of the European Foundations Center focusing on research.

Conclusion

IPSO represents a unique initiative to use science and education as a tool to work for peace in this troubled region. Its mission is to strengthen the infrastructure and provide opportunities for excellence in research and training in Palestine. The lack of financial resources has always restrained these efforts to move forward on a broader front. Nonetheless, the success in the various programs described above shows that advances can be made and provides the rationale for our request for continued financial support. The founders and directors of IPSO remain optimistic because a beachhead has been established and continued support from the Lounsbery Foundation will make it possible to maintain and further develop the programs sponsored by IPSO.

IPSO BUDGET REQUEST: 2011-2014

	2011-2012 (Year 1)	2011-2014 (Years 1-3)
1. Human Resources		
a. Administration (Co-Directors)	22,000	66,000
b. Website Development and Maintenance (Technology Consultant)	6,000	18,000
2. Operations		
a. Staff Travel	10,000	30,000
b. Office Rent and Municipality Charges	18,000	54,000
c. Utilities and Office Maintenance	9,500	28,500
3. Indirect Costs/Overhead	9,500	28,500
Total	**75,000**	**225,000**

October 4, 2010

Mr. Maxmillian Angerholzer III
Executive Director
Richard Lounsbery Foundation
1020 19th Street, NW, Suite LL60
Washington, DC 20036

Dear Mr. Angerholzer:

We appreciate the opportunity to submit the attached proposal, the American/ Iranian/Afghan Rural Health Research Project, for funding consideration by the Richard Lounsbery Foundation.

The project's objective, to help develop indigenous primary health care capacity of the Afghan Ministry of Public Health, is supported by our ongoing productive collaboration with Shiraz University of Medical Science and Health Services (SUMS) in Iran. In 2008, we asked SUMS for assistance in adapting the effective Iranian primary health integrated network delivery model to address the systemic health disparities in the rural Mississippi Delta and are pleased by the positive response and their assistance. Plans are being implemented to expand collaboration, including extensive academic and research exchanges, especially among public health and medical students from our university partner, Jackson State University, and SUMS.

Last April, Dr. Tawab Saljuqi, an Afghan doctor studying in the U.S. under a Fulbright scholarship, contacted us about the MS/SUMS project and the potential for expanding its scope to include assistance in strengthening the primary care infrastructure of his homeland. Last month, I met with H. E. Dr. Suraya Dalil, Afghan Interim Minister of Public Health, to further discuss Dr. Saljuqi's request. This proposal is an outgrowth of those discussions and the Afghan's MoPH interest.

We believe the project aligns with Lounsbery Foundation interests as it promotes exchanges among young physicians and emerging leaders of the Afghan MoPH, SUMS, and Mississippi academic and research institutions. It is, in the truest sense, an example of health diplomacy. The potential Lounsbery Foundation grant of $69,000, including indirect costs, also is critical to the future of this endeavor, as it will help jump start potential USG and major donor support to implement a pilot primary care delivery system in the Afghan border region with Iran. This project not only will enhance the delivery of services and promote Afghan community revitalization, but also constructively engage an Iranian academic institution to proactively help stabilize the border region with Afghanistan.

The lead non-profit for this application is the Jackson Medical Mall Foundation (JMMF), a 501 (c)(3) established in 1995. JMMF is a leader in improving the health and lives of the poor in Jackson, Mississippi, and the greater Delta region. The JMMF organizational structure enables it to effectively support innovative projects that promote health care programs for the rural poor both in this country and internationally.

Thank you again for the opportunity to submit this proposal for consideration by your board. If you have any questions, please let me know.

Sincerely,

James Miller
Managing Director

Attachment

Jackson Medical Mall Foundation
Mall Services
Suite 615
350 W. Woodrow Wilson Dr.
Jackson, MS 39213 USA

American/Iranian/Afghan Rural Health Research Project

The stabilization and reconstruction of Afghanistan is a critical foreign policy challenge for the United States and its NATO allies. Support for a fully functional Afghan State, made more problematic from decades of conflict and neglect, is essential to the long-term stability of that region and to the improvement of conditions for the people of the country. In addition to security, the populace of Afghanistan is in desperate need of increased access to effective primary health care, especially in the rural regions, and for women and children.

Currently, health services in Afghanistan are delivered primarily by NGOs contracted through the Ministry of Public Health using funds provided by the United States Agency for International Development (USAID) or independently from foundations and other donors. Although these NGOs fill a void created by the lack of indigenous capacity of the Ministry of Public Health (MoPH), long-term, this "outsourcing" impedes development of the country's internal service delivery and administrative capability. These capacities are essential for the ultimate and successful transition to a greater indigenous Afghan institutional responsibility for the health of its people and accountability to the international community providing reconstruction support.

In the context of its neighbors and regional political considerations, Iran, which shares a common border with three Afghan western provinces, increasingly is seen as having a potentially constructive role in stabilizing the region. Iran also has a highly effective primary healthcare system that reaches isolated rural areas, serves multiple ethnic groups and regions, and, in thirty years has completely eliminated health disparities between its urban and rural populations. General David H. Petraeus, has said Washington and Tehran could coalesce around stabilizing Afghanistan. Masood Aziz, a former Afghan diplomat in Washington, predicts, "Iran is going to be one of the key pillars of our strategy which is going to help resolve this issue." But he adds: "Discussions and talks are one thing; how to go about implementing cooperation [with Iran] is another." This project provides an opportunity for such cooperation that benefits Afghanistan.

The objective of this proposal is to bring together young physicians and emerging leaders within the Afghan MoPH to collaborate with experts from the U.S. and Iran currently engaged in a comprehensive rural health system implementation and health worker-training project in the Mississippi Delta, a region of major health disparities for African-Americans. The intent is to hold a three-day conference in January 2011 under the auspices of the WHO in Geneva that includes representatives from Afghanistan and the U.S./Iran rural health partnership - Jackson State University (historically black university) Jackson Medical Mall Foundation (lead non-profit), the Center for International Research on the Social Determinants of Rural Health (MS), and Shiraz University of Medical Science and Health Services. The conference deliverable will be a comprehensive primary health care/community revitalization pilot plan for the Afghan Iran border provinces. An intangible result - but equally important - will be to help promote long-term relationships between young Afghan doctors and their counterparts in the U.S. and Iran.

Funding for this proposal is essential for securing U.S. Government and major donor assistance to support this capacity-building program for the Afghan MoPH. Significantly, it also provides Afghan MoPH leadership an opportunity to look beyond the immediate pressures and challenges stemming from the current conflict and, with input based on lessons-learned from the successful Iranian system strengthened through the Mississippi partnership, develop new ideas for implementing effective health care and community revitalization services throughout the nation.

Projected cost is $69,000 (including indirect of 15%).

Background - MS/Iran Rural Health Care Project

For decades, health indicators in Mississippi - especially for the African-American population in the rural Delta region - showed minimal improvement. National surveys, including those conducted by the Commonwealth Fund and the United Health Foundation placed Mississippi last, or next to last, in state rankings. Despite millions spent on health care in the Delta - Mississippi has the third highest per capita health expenditures - the existing system has proven to be both extremely inefficient and grossly ineffective.

In 2007, a public/private consortium of Mississippi universities and organizations began an international initiative to identify models of healthcare delivery that offered the potential of addressing the pervasive, systemic challenges in the Delta. Conditions in Mississippi are in many ways similar to those found in developing nations, and they have been exacerbated by a legacy of slavery, discrimination and regressive public policy towards African-Americans.

One of the most promising healthcare systems identified for possible replication was found in the Islamic Republic of Iran; an integrated system developed by innovative public health pioneers over a period of three decades under very adverse circumstances. Iran is a nation with outstanding modern medical universities, hospitals and physicians, but, as in the United States today, it was faced with major public healthcare challenges, especially in the poor rural regions of their country. However, in contrast to Mississippi, Iran has made very significant progress in improving health outcomes for its rural population during the last 30 years, and the Iranian system effectively eliminated health disparities between the rural and urban populations.

Through existing relationships in Iran, in February 2009, Shiraz University of Medical Sciences (SUMS) and IRI PHC leadership were contacted regarding the potential of assisting the Mississippi consortium in developing a model rural healthcare program. The response from SUMS, key national PHC officials, and the IRI Ministry of Foreign Affairs, was immediate and positive. The subsequent research trip to Shiraz and Tehran, May 2009 confirmed the initial assessment regarding the viability of the PHC model for the Delta.

As a result, the MS group and SUMS agreed to cooperate in five key areas:

1. Assistance in the adaptation and implementation of the IRI health house model in rural areas of the Mississippi Delta and other regions as may be appropriate
2. Joint research and other activities related to the social determinants of health;
3. Collaboration in HIV/AIDS research
4. Establishing academic and other institutional exchange programs
5. Developing other opportunities for collaboration that will help promote greater understanding and mutual respect among the Parties and between the people of the Islamic Republic of Iran and the United States of America

Additional areas of cooperation are planned, including establishment of a joint SUMS/JSU public health degree program, with a specialization in rural health issues, establishment of an international community health worker training center at the Jackson Medical Mall, and young Iranian primary care physicians coming to the Delta region of Mississippi to serve for three years in an area designated by the U.S. Health Resources Services Administration as a Health Professional Shortage Area.

Throughout the evolution of this MS/SUMS rural health project, the U.S. Department of State, Bureau of Near Eastern Affairs, Iran Desk has been involved in an unofficial advisory capacity, and has been very supportive of this effort. Mr. Jeffrey Feltman, Assistant Secretary of Near Eastern Affairs, wrote to Dr. Aaron Shirley, one of the leaders of the MS/Iran PHC project:

> "Based on accounts of your recent trip to Iran, it appears you have made significant connections with your Iranian counterparts and health care professionals. While this is a time of tension between the United States and Iran, we look forward to opportunities to build on areas of mutual interest, particularly in the field of health and medicine.
>
> "Accordingly we support your efforts to develop linkages between one of Mississippi's Historically Black Colleges and Universities and educational institutions in Iran through programming initiatives based on international rural health…
>
> "This initiative positively demonstrates how the United States can benefit from techniques that Iran has developed in the field of rural health. We applaud your efforts in leading partnerships of this kind."

In October 2009, a group of five Iranian doctors came to Jackson, Mississippi, to participate in a conference on health disparities and begin the process of planning the adaptation of the Iranian health house network for the rural areas of the state. The role of the Iranian physicians, which included two of the three original architects of the IRI PHC system, Dr. Hossein Malekafzali and Dr. Kamal Shadpour, was to offer their expertise in developing the strategy for meeting the specific requirements of Mississippi Delta public health challenges. Also attending was SUMS Deputy Chancellor and SUMS/Mississippi Project leader, Dr. Hassan Joulaei. The Iranian doctors toured the Delta region, met with residents and community leaders, and based upon their observations, have provided substantial information and advice that fits the needs and resources of the target area. Travel support for the Iranians' visit was provided by the U.S. Department of State (DoS). The MS/SUMS project has been issued OFAC License No. IA-12003.

Others participating in the Jackson conference included representatives from the World Health Organization and the National Institutes of Health, Fogarty International Center. Judy Levin, Fogarty Center program officer for the Middle East and North Africa, Division of International Relations, said in an article on the project and conference published in Global Health Matters/Dec 2009, "This is a wonderful example of how science can provide the basis for meaningful exchanges. It also shows that great

ideas can come from unexpected places and when we look outside our borders we discover how much we can learn from others."

The DoS Office of Public Diplomacy also has approved a grant (September 2010) that will support travel for six SUMS doctors to come to Mississippi for two months beginning in February 2011, to 1) assist in final development of the community health worker training curriculum for the international community health worker training center, 2) tour the Delta region to assist in the assessment of the level of services needed for each community health house site and to determine resources that would be required for maximum effectiveness, 3) work on the initial framework of the joint public health degree program between Jackson State University and Shiraz University of Medical Sciences and the operational requirements for the online coursework, 4) provide the opportunity for medical students and nursing personnel of both countries to better understand and appreciate the perspectives and professional experiences of their counterparts, and 5) meet with medical and educational institutions to explore ideas for potential joint medical and rural health care research programs and academic exchanges.

Note: This two-month period of work in Mississippi will allow for follow-up development of the Afghan MoPH strategy finalized during the Geneva conference including an expansion of the training curriculum for the new center to include health workers from Afghanistan. It is envisioned that, due to security concerns, initial training will take place in Mississippi, which also will allow Afghan contact with the Iranian PHC experts.

In the December 20, 2009, London Times article, "Deep South calls in Iran to cure its health blues," a U.S. State Department official is quoted: "The Iranians are a proud people with 5,000 years of history and huge contributions to science and medicine. A project like the Mississippi one is incredibly powerful as it appeals to that Iranian concept of history. It's a great way to keep the door open between the two countries."

Other very positive media coverage includes articles in U.K.'s Lancet Journal, the Los Angeles Times, Washington Post/AP, and stories on NBC Nightly News and Al Jazeera. In response to the Los Angeles Times article, Dr. K. B. Lankarani, former IRI Minister of Health and current director of the Health Policy Research Institute at SUMS, sent the following message to officials at the Ministry of Health (forwarded by SUMS):

> "Recently in a report in Los Angles (sic) Times the project of cooperation between Jackson state university and Shiraz university of medical sciences has been introduced. The project is on modeling of health houses in Iran in Mississippi delta.
>
> "The article starts with this point: The political hurdle could be high for a Delta doctor looking for low-cost rural healthcare solutions in an unlikely place: Iran.
>
> "This makes the topic more interesting. I think we should appreciate what we have, although we must not ignore our problems and we should work harder for improvement in our system, but this frame shows that not every solution comes from aboard (sic). Sometimes we have things to offer to the world even to the most dominant super power."

The MS/SUMS PHC project steering committee includes:

- Dr. Jack Geiger, Arthur C. Logan Professor of Community Medicine Emeritus, City University of New York Medical School/Sophie Davis School of Biomedical Education
- Dr. David Satcher, Director, The Satcher Health Leadership Institute and Center of Excellence on Health Disparities, Morehouse School of Medicine
- Dr. Jon Andrus, Deputy Director, Pan American Health Organization/World Health Organization
- Donna Shalala, President, University of Miami

WHO Representatives assigned to provide technical support for MS/SUMS project:

- Dr. Hernan Montenegro, Senior Regional Advisor on Health Systems and Services (Washington, DC)
- Dr. Mario Cruz-Penate, Advisor, Health Systems Strengthening (Washington)
- Dr. Sameen Siddiqi, Coordinator, Health Systems Development (Cairo)
- Dr. Mohamed Assai, Regional Advisor for Community Based Initiatives (Cairo)

Afghan MoPH Interest in MS/SUMS Collaboration

In April 2010, Dr. Abdul Tawab Kawab Saljuqi, MD, a Fulbright student from Afghanistan studying at the University of Arizona, contacted James Miller, Managing Director of the Center for International Research on the Social Determinants of Rural Health regarding the MS/SUMS health house network project and collaboration with Iranian PHC experts. Dr. Saljuqi expressed interest in its potential for implementation in the Afghan-Iran border region and other rural areas of the country. He indicated the primary health care infrastructure in his country was in need of support and during two years of study in Iran became aware of the effectiveness of their health house network.

On September 17, Miller met with H. E. Dr. Suraya Dalil, Acting Minister of Public Health of Afghanistan to discuss potential collaboration with the Afghan MoPH. Dr. Dalil expressed strong interest in this idea, and indicated that she, along with a number of national health ministries in the region greatly respected the Iranian PHC system, in particular its highly successful family planning and infant health programs. Dr. Dalil also expressed the hope that this potential collaboration with the MS/SUMS team would result in the IRI's constructive participation in helping stabilize Afghanistan, in particular along the common western border region.

Further discussions with Dr. Saljuqi and University of Maryland School of Public Health professor, Dr. Muhiuddin Haider, an Afghan who worked for a number of years on USAID projects in the region, provided additional insight into the potential of collaboration:

1. Given the opportunity to develop a strategic plan independent of NGO involvement, it would be possible for the Afghan MoPH to better define how it can build sustainable indigenous capacity for the long term.

2. The Afghan/Iran border region, while relatively more secure than other areas of the country, is in substantial need of rural health care services and facilities such as community health houses, making this an excellent region in which to implement an Afghan MoPH-led primary health care services project.
3. Working through the MS/SUMS partnership, it would be possible for the Afghan MoPH to constructively engage the Iranians more "behind the scenes" rather than having the appearance of a direct Tehran-Kabul link.
4. The MoPH is seeking to move the issue of public health to a higher place on the nation's list of priorities, and by implementing this hybrid MS/Iran health house system, which includes an emphasis on community development and addressing the social determinants of health, it has the potential of increasing the positive focus on the MoPH's efforts.

The U.S. State Department's Senior Policy Advisor on Afghanistan assigned to USAID, Kathleen McGowan, indicated this potential collaboration with the MoPH, which is viewed as one of the more capable ministries within the Afghan government, could be used as a model for building capacity and transitioning public services responsibility away from NGOs and international agencies to the Afghan people. Ms. McGowan also indicated the link with Iran through the MS project as a very positive way to engage the Iranians in stabilizing Afghanistan on their eastern border. This humanitarian project with its community development focus also has the potential for encouraging Afghan refugees in Iran who have been fleeing their war-torn homeland for the past two decades to return to western Afghanistan. This issue is of interest to the Iranian government.

Situational Analysis of Afghan Health Care System and Needs

Currently, 82% of the entire population of Afghanistan lives in districts where primary care services are provided currently by NGOs, under various contracts with the Ministry of Public Health of Afghanistan or through grants. Much money and effort has been put into establishing tertiary care hospitals, but a coordinated health care infrastructure has not yet been developed. Consequently, many population groups are still living without access to primary care. There is also a major shortage in the health care workforce of Afghanistan. World Health Organization data show that there are only 6,000 physicians and 14,000 nurses for a population of 28 million people.

Challenges in establishing Afghanistan's health care system include a lack of infrastructure, poor coordination among government and health care providers, and difficult access to many existing health care facilities. Integration and coordination between the Ministry of Public Health, NGOs and various sectors of the Afghan government will be required to create a sustainable health care network for the entire country. And, while basic health care is important, the lack of food, clean water, and shelter must also be addressed to improve community health, so proposed community health centers would also fall under the focus of the revitalization strategy.

One of the main hurdles for establishing a reliable Afghan health care system is training and deploying qualified health care workers. During the Taliban years, many health care professionals were killed or fled the country. Of those who remain, medical training is inconsistent because of the lack of standardized educational programs. While

the number of overall health care workers is improving, the focus must be on women. As in Iran, Afghan societal norms dictate that only women can provide medical care for women, and the Iranian PHC system has been very successful in accomplishing this throughout its tribal and nomadic populations.

The triple challenge of establishing a functional health care system in Afghanistan includes the fact that it is a developing nation, a post-conflict nation, and a combat zone. The long-term goal of quality health care for all its citizens will only be met by a combination of specific goal-oriented projects, foreign aid, and domestic responsibility, unified under a system-wide approach. Although progress has been made, the country's health care system still needs significant improvement before it meets basic and higher-level health care standards for the majority of its population and without that, stabilization for the long term is not probable. The focus on primary health care in Afghanistan is particularly appropriate, because providing basic primary care for families is a cost effective first line of defense in not only preventing disease, but in building public support for a central government.

Thirty years ago, the Iranian health care system was faced with many of the same challenges, including the Iran-Iraq war, an economy in deep recession and a critical shortage of health care workers. Access to primary care services in rural areas was almost non-existent. There was strong opposition at the time to this concept from health experts who thought the proposed primary care infrastructure too ambitious and the scheme a regression in health care owing to the limited education of community health workers (behvarzan). Despite this opposition and the debilitating war, the master plan to bring health to every district has been largely successful and has supported development in rural areas. Two of the three architects of the Iranian PHC system are directly involved with the Mississippi project and available to advise the Afghan MoPH in developing strategies to address the current situation and long-term needs of its unique population groups.

There are some similarities in the current Afghan approach - the use of community health workers through community health posts (or houses); however, there are two major differences. First, the Iranian community health workers are more pro-active with the communities and recruited from the villages in which they will serve, which improves cultural acceptance and ensures community support. Second, the Iranian PHC system is more highly integrated and thus able to coordinate services among providers and health care levels. This integration is one of the keys to the Iranians' success over the years. The MS project partners have been developing an IT-based system using the Iranian model as a template and which can, given the wireless networks established by the U.S. throughout the country of Afghanistan, be implemented in a timely, cost-effective way, providing the coordination needed to track outcomes and determine need.

Key Project Personnel:

Afghanistan

H. E. Dr. Suraya Dalil, Acting Minister of Public Health, Islamic Republic of Afghanistan. Dr. Dalil has a master's degree in public health from Harvard University School of Public Health. Despite the civil war, she remained in Afghanistan for much of

the 1990s and graduated from the Kabul Medical Institute in 1992. Soon after the Taliban government emerged, she moved to neighboring Pakistan along with her family. She frequently visited her homeland to train midwives and doctors before returning to Kabul in 2002. Dr. Dalil also has worked for UNICEF in Kabul and Somalia.

Dr. Abdul Tawab Kawa Saljuqi, is a 2009-2010 Fulbright scholar student from Afghanistan, studies Public Health at Mel and Enid Zuckerman College of Public Health (MEZCOPH), University of Arizona in Tucson. His concentration is Health Promotion and Health Behavior, but his focus includes Public Health Policy and Management and Health Diplomacy. From 2005 to 2009, he served as Director of the Health Promotion Department in the Afghan Ministry of Public Health. He was Chief Editor of an Afghan health magazine, *Salamati*, in 2004. He received his MD from Afghan University in 2003. Upon completion of his graduate program (in Summer 2011), he will rejoin the Ministry of Public Health, and plans to teach public health within various academic institutions.

Other Afghan MoPH officials invited to participate:

- **Dr. Tawfiq Mashal**, General Director for Preventive Medicine and Primary Health Care, MoPH
- **Dr. S. Habib Arwal**, Director of Community Based Health Care Department, MoPH
- **Dr. Rasoul Mofleh**, Acting Director of Health Promotion Department, MoPH
- **Dr. Ghulam Sayed Rashed**, Herat Provincial Public Health Director, MoPH

Iran

Dr. Hossein Malekafzali is Director of Public Health Research Institute, professor of Biostatistics and Epidemiology, Tehran University of Medical Sciences and Health Services, Islamic Republic of Iran. During his 25 years experience, Dr. Malekafzali has been involved in the nationwide expansion of the district health system based on primary health care; implementation of a population control program and reproductive health including family planning; establishment of an information system at the first level of the district health system; establishment of the women's health volunteer program at the national level and community participatory research program. Dr. Malekafzali is the winner of the UN Population Award in 2007 and is a member of the advisory committee for health research, WHO Geneva, and is member of the Regional Certification Committee for Polio Eradication at the WHO Eastern Mediterranean Regional Office.

Dr. Kamal Shadpour served as Senior Expert on Primary Health Care, Under-secretariat for Public Health, Ministry of Health and Medical Education (MOH & ME), Tehran. Since 1963, Dr. Shadpour has held a range of public health positions at the provincial and national levels, and was one of three team members that, from 1980-1985 designed the new national health delivery system in use today. In 2005, Dr. Shadpour was awarded the WHO A.T. Shousha Award, for his outstanding contribution to national health policy development, community health delivery, and public health programs in the Eastern Mediterranean Region.

Dr. Hassan Joulaei, Pharm.D, MPH, is Deputy Vice Chancellor for Health, Shiraz University of Medical Sciences. Dr. Joulaei has served in various administrative capacities and managed Fars Province community participant and family physician programs, expanded the health system, conducted research on health systems, and established an HIV/AIDS research center at SUMS. Dr. Jouleai also has spent time in China and The Netherlands studying health system reform, health management, health policy, and health system research.

Mississippi

Dr. Aaron Shirley is Chairman of the Board for the Jackson Medical Mall Foundation. Dr. Shirley has dedicated his life to others as a pioneer of rural and urban health care for the state of Mississippi and took his pediatrics residency at the University of Mississippi in 1965 and was the first African American to accomplish this feat. In 1970, he helped to establish the Jackson Hinds Comprehensive Health Center, which became the largest community health center in the state. He also established a comprehensive school-based clinic to provide health and counseling services to help reduce teen pregnancy, drug abuse, teen violence, sexually transmitted diseases, and mental health issues. The clinic became a national model for school-based clinics. Dr. Shirley is a graduate of Tougaloo College in Tougaloo, MS and Meharry Medical School located in Nashville, Tennessee. In 1993, Dr. Shirley received the MacArthur Fellows Award.

Mohammad Shahbazi, Ph.D., MPH, CHES, is a professor of public health and chair, Department of Behavioral and Environmental Health, School of Health Sciences, College of Public Service at Jackson State University. He holds a Ph.D. in Cultural Anthropology from Washington University in St. Louis, and an MPH from the UCLA School of Public Health, and also is a nationally certified Health Education Specialist (CHES).

James Miller, Project Director, is Managing Director of Oxford International Development Group (a professional services and consulting company located in Oxford, MS), and the Center for International Research on the Social Determinants of Rural Health at Jackson Medical Mall. Miller's analysis of both the Primary Health Care System in Iran and the systemic health care challenges faced by residents in Mississippi prompted the development of the Mississippi/IRI PHC Applied Research project which led to collaboration between the MS and Iranian institutions.

Jackson Medical Mall Foundation - 501(c)(3) lead non-profit

Established in 1995, Jackson Medical Mall is a comprehensive, multidisciplinary health care complex serving Jackson's urban poor and now promoting the development of more region-wide primary health care services through the community health house network project, specifically targeting the Delta region of the state. Among the health care and social services located in the Medical Mall are the Hinds County Health Department Clinic, numerous University of Mississippi specialty clinics, including clinics for cardiology, obstetrics and gynecology, and oncology, and the Mississippi Health Advocacy Program. As a non-profit, the Jackson Medical Mall Foundation board consists of representatives from the University of Mississippi Medical Center, Jackson State University, Tougaloo College (Historically Black College and University) and two at-large members from the community.

Budget

Travel	No. RT Tickets	Cost per ticket	Total
Air - Economy Class			
RT Kabul/Geneva*	5	$3,000	$15,000
RT Tehran/Geneva	3	$1,500	$4,500
RT JAN/Geneva	4	$1,500	$6,000
Hotel	Room Nights	Per Room	
12 people x 4 days	48	$300	$14,400
Per Diem	Days	Per Day	
12 people x 4 days	48	$100	$4,800
Staff			
Project Coordinator			$4,500
Research Report Development/Writer			$7,500
Misc expenses			
Visas			$800
Food			$1,000
Misc			$1,000
Local transportation			$500
		Sub-total	**$60,000**
Jackson Medical Mall Foundation Indirect (15%)			$9,000
		Project Total	**$69,000**

*Does not include Minister of Public Health

Submitted by
James Miller, Managing Director
Center for International Research on the Social Determinants of Rural Health
Mississippi Community Health House Network
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662-202-8854

Organization:

Applicant organization: Consortium for the Barcode of Life, US National Museum of Natural History, Smithsonian Institution

HQ location: Washington, DC

Mission: To develop and promote DNA barcoding as the global standard for identifying species

Requested Grant Amount: $3,000,000 over two years

Big Idea:

Standardized tools from biotechnology and web-based informatics can enable the protection of endangered species around the world

Project Description:

What are the anticipated measurable results?

There are approximately 1.8 million formally named and described species on Earth. Of these about 33,000 have been categorized as being in danger of extinction by the UN Convention on International Trade in Endangered Species (CITES). Approximately 1,200 are protected by CITES from exploitation for international trade. The 175 countries that have ratified CITES are expected to enforce these protections through national legislation, regulation and enforcement. The Endangered Species Act is the US legislation for CITES compliance. Unfortunately, not all CITES countries have effective legislation and systems of enforcement to stop illegal trade in endangered species. Population decline among endangered species due to poaching and illegal export has continued.

This project will support the reversal of this trend by implementing a scalable and cost-effective system of detection and enforcement based on 'DNA barcoding', a technique for identifying species using the digital DNA sequence of a very short, standardized gene region. Species are normally identified by visual inspection using diagnostic morphological features. This is a slow and expensive process that can yield uncertain results when expert taxonomists are unavailable or the critical features aren't present. For example, protected bird and plant species are often smuggled as eggs, seeds, or cuttings which lack the diagnostic features visible on adults or flowers. DNA barcode analysis requires only milligrams of tissue taken from any part or growth stage of an organism or from many derived products. A CBOL-initiated project, working with the US Centers for Disease Control and Prevention (CDC) recently published a report of primate 'bushmeat' confiscated at US international airport and identified with barcoding in which infectious viruses were found (see Washington Post coverage).

Border inspectors will be able to obtain reliable identifications by taking tiny samples from confiscated items, submitting them for overnight DNA sequencing, and comparing the sequences with records in a public reference database of well-identified museum 'voucher specimens'. The reference database already exists on GenBank, the DNA sequence database of the US National Institutes of Health, but there are relatively few records for endangered species. For example, there are approximately 5,500 known species of mammals, of which more than 800 mammal species are protected under CITES and more than 1,100 are categorized as threatened on the 'Red List' of the IUCN (World Conservation Union). Reference barcode records have been obtained for only 256 mammal species, very few of which are protected under CITES. About 24% of all bird species have been barcoded and 45% of IUCN-listed bird species are represented in frozen tissue collections. Only 7.7% of those species have been barcoded. Two-thirds of the 15 CITES-listed species have been barcoded but relatively few of the 1,275

IUCN-listed fish have been barcoded yet.

The goal of this two-year project is to initiate a chain reaction involving selected government agencies toward using DNA barcodes for improved species protection through border inspection, and the investigation and prosecution of illegal poaching and trafficking. This chain reaction would continue after the project terminates and would lead to universal implementation of stricter enforcement. The process leading to these goals and their associated deliverables is:

1. **Designing and building a public and freely accessible database** of reference DNA barcodes for endangered species. To promote international buy-in, CBOL will develop a network of national conservation authorities from six biodiversity-rich developing partner countries. This network will create a list of approximately 2,000 endangered species, including: (a) all species in CITES Appendices I and III; (b) several hundred species in CITES Appendix II that are high priorities to the partner countries; and ~8,000 closely related species and look-alikes that represent potential false-positive identifications.

   CBOL would then use its network of museums, zoos, conservation centers, research organizations and biodiversity initiatives to identify potential sources of well-identified voucher specimens from which reference barcode records can be obtained. Agreements to participate in the project would be negotiated with them and technicians would take tissue samples that would be sent to regional processing centers. At least five specimens per species will be barcoded to ensure that geographic variability is taken into account when identifying unknowns.

   Performance indicators for this process are:

   a) Level of involvement by partner countries and relevant agencies and institutions;
   b) Countries and organizations that are contributing voucher specimens for construction of the reference library;
   c) Percent of targeted endangered species and close relatives that have been barcoded; and
   d) Numbers of specimens per species that have been barcoded

2. **Engaging government agencies and research institutions through outreach and training.** As construction of the reference library proceeds, CBOL will manage a parallel process that prepares government agencies to use the reference library for border inspection, investigations, courtroom prosecutions, and other enforcement measures. This process will begin with workshops to determine the types and quality of evidence that partner countries will need in their investigation and enforcement activities. These workshops will lead to the development of Standard Operating Procedures (SOPs) for handling and analyzing evidence and preparing data for criminal procedures. These SOPs will form the basis of developing systems that partner countries can use to produce barcode data from confiscated material. The project will provide the necessary training for researchers, technicians, prosecutors and judges who will be engaged in the preparation and use of barcode data for forensic use.

   Performance indicators for this process are:

   e) Level of participation by partner countries and relevant government agencies;
   f) Creation of SOPs for enforcement activities;
   g) Construction of in-country barcoding pipelines for processing evidence;
   h) Enforcement officials receiving training;
   i) Regional processing centers prepared to process incoming samples; and
   j) Inspection stations equipped and capable of conducting barcode sampling.

How will the project move the Big Idea forward?

3. **Creating a multiplier effect.** Constructing the reference barcode database is a necessary but not sufficient step in moving the Big Idea forward. Government officials will need to be transformed from cautious onlookers of barcoding (and skeptics in some cases) into zealots who don't want to be left behind a growing wave of adopters. The project will concentrate on six key developing countries: South Africa, Kenya, Nigeria, Mexico, Brazil, and a southeast Asia country to be selected in early 2013. CBOL will partner with these countries to create small-scale pilot projects that test the effectiveness of barcoding in their inspection and enforcement efforts. Early success stories will be highlighted in press releases and presentations. CBOL's network of partners will be critical in disseminating these success stories and building momentum for formal adoption.

   Performance indicators for this process are:

   k) Seizures of contraband endangered species, arrests and prosecutions stemming from DNA barcode evidence;

   l) Media coverage of success stories about illegal poaching and trade in endangered species revealed by DNA barcodes;

   m) Presentations about barcoding to national conservation agencies (e.g., US Fish and Wildlife Service, NOAA), CITES and IUCN meetings, NGOs (e.g., Traffic, World Wildlife Fund);

   n) Memoranda of Understanding between CBOL and key agencies and organizations; and

   o) Announcements of formal approval and adoption of barcoding by government agencies, IUCN, CITES and other enforcement organizations (e.g., Interpol).

Team: *Key project leaders & background:*

- **Project management:** CBOL, Washington, DC
- **Leading DNA barcoding labs:** Laboratories associated with the Smithsonian Institution's National Museum of Natural History (NMNH) and the National Zoological Park (NZP); the Canadian Centre for DNA Barcoding (CCDB), University of Guelph, Ontario, Canada; other members of CBOL's Leading Labs Network.
- **Major repositories of biodiversity samples:** The Smithsonian's NMNH and NZP; the San Diego Zoo; the American Museum of Natural History, New York; Natural History Museum London; the Museum National d'Histoire Naturelle in Paris, and others.

Other organizations involved:

- National conservation agencies in the six partner countries
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- TRAFFIC, the wildlife trade monitoring network established by IUCN and the World Wildlife Fund
- US Fish and Wildlife Service (FWS)
- US Department of Agriculture
- US National Oceanic and Atmospheric Administration (NOAA)
- The World Conservation Union (IUCN)

Summary of leadership experience in this area: CBOL has eight years as the demonstrated leader for global coordination and promotion of DNA barcoding with:

- 200 Member Organizations in 50 countries
- Credibility and social equity around the world based on outreach workshops and conferences, a history of training and supporting international partners, and unfailingly open and honest programs
- Barcode of Life Connect, a social network with 1800+ members
- A strong record of leverage with and co-funding by partner organizations

Geographic reach:

Project will directly impact:

The near-term impact will be reducing the illegal poaching and international trade of endangered species coming from six developing partner countries that are major biodiversity hotspots on Earth.

Big idea/ scale will impact [location]:

The reduction of poaching and illegal trade in these important countries will set in motion a political chain reaction leading to adoption of DNA barcoding as the standard tool for species identification used by all national governments and international organizations such as CITES, IUCN and Interpol.

Expected Project Outcomes:

- **Benefits:** The risk of extinction will be reduced for potentially hundreds to thousands of endangered species. Wildlife and its associated benefits will be preserved for millions of developing country citizens.
- **Scale:** Benefits will emerge first in participating developing countries and will eventually spread to other countries that are party to CITES.
- **Timeline:** Library construction and training will be in full operation by Q3 and will peak in Q6-10. First pilot tests are expected as early as Q5 and dissemination of success stories should begin thereafter.

Concept & Rationale

Problem: Overexploitation is one of the three major threats to biological diversity on Earth, along with habitat conversion and environmental degradation. The Convention on International Trade in Endangered Species (CITES) is a UN treaty ratified by 175 countries, including the US. CITES states:

> ***Annually, international wildlife trade is estimated to be worth billions of dollars and to include hundreds of millions of plant and animal specimens. The trade is diverse, ranging from live animals and plants to a vast array of wildlife products derived from them, including food products, exotic leather goods, wooden musical instruments, timber, tourist curios and medicines.***

Solution: Why is this particularly clever, impactful, novel? A public database of reliable DNA barcodes could put species protection on a standardized, cost-effective footing that species-rich but technology-poor countries can implement. The proposed database would be a 'global public good' which, unfortunately, makes it vulnerable to 'the tragedy of the commons'. All countries would benefit and therefore no countries want to absorb the initial costs of implementation by themselves. Support from the Google Foundation would create a digital resource, connected to biological voucher specimens in museums, herbaria and other reference collections around the world that would be universally accessible without charge. National, regional and local authorities could then protect their precious biological legacies with a technique that is accepted around the world.

DNA barcoding was extremely novel and controversial when it was introduced in 2003. Since then it has been tested on a broad range of taxonomic groups in labs around the world. It has become a standard tool for biological research, now cited in hundreds of peer-reviewed research articles per year. Cutting edge barcode research in a few advanced labs now involves the use of 'Next Generation Sequencing' of environmental mixtures with tissue from potentially hundreds to thousands of species.

While the last eight years have seen barcoding become mainstream in leading academic labs, applications of barcoding for socioeconomic applications are rare, especially in developing countries. The equipment and skills needed for DNA barcoding are found in nearly every US college and university but are beyond all but a few institutions in developing countries. This project will bring revolutionary

change to these countries and will help them protect some of their most important assets.

What are the risks and how are they mitigated? The technical feasibility of developing a reference barcode database and using it for regulation and enforcement are no longer in question. The US Food and Drug Administration and several non-US counterpart food agencies have formally approved barcoding for detecting fraudulent seafood labeling. The US Federal Aviation Administration identifies birds that hit airplanes using DNA barcoding. The principal challenge will be to develop the public barcode reference database and awareness of it among government conservation officials to a tipping point. Currently, these officials can be skeptical about barcoding because there is no reliable public database so being an early adopter involves political risk. As the database grows and more countries begin to test it, officials from other countries will begin to wonder how long they can remain skeptical without attracting criticism from their governments and citizens.

The principal risk, then, is failing to engage early adopters of barcoding in a few important, biodiversity-rich developing countries. Outreach, training, technical assistance and the development of trust relationships will be critical in building their sense of partnership and ownership. For this reason, CBOL proposes to work with 11 developing countries that are politically influential in their respective regions (Kenya, Nigeria, South Africa, Namibia, Mexico, Colombia, Brazil, Argentina, China, India, and the Philippines) and have been involved in CBOL's barcoding activities in the past.

The principal logistical challenge will be obtaining tissue samples from endangered species and their close relatives. These species are, by their endangered nature, rare and protected by national and international regulations. Many samples of these species reside in major museums in Washington, New York, London and Paris, but their DNA may be degraded to the point of being useless for barcoding.

How is this a leveraged play?

The greatest cost in DNA barcoding, by far, is obtaining well-identified voucher specimens on which reference records will be based. Specimens from many, perhaps most endangered species, already reside in museums and herbaria around the world. The project will leverage the networks and trust relationships that CBOL has established over the past eight years. These relationships will enable the project to access and use valuable voucher specimens of endangered species for the transaction costs only (i.e., paying a technician to take tissue subsamples, copy the specimen data into a spreadsheet, and ship them to a processing center).

Landscape: Are there others taking this on?

Not on this scale. CBOL and AMNH (NY) have collaborated on an effort to provide barcode training to officials and technicians from the US Fish and Wildlife Service. No similar efforts are underway.

Sustainability: If the idea works, how will it be sustained and spread?

If the project succeeds in convincing the participating countries to test and adopt DNA barcoding as a tool for inspection, enforcement and prosecution, the operating budgets of their relevant agencies will begin to include the costs of equipment, supplies, technical staff and training. As these key countries begin to use barcoding other countries will follow suit because they won't want to be viewed by their citizens and the world as sources of illegal exports.