

RFI Responses: Question 2A – Where are the new and/or best opportunities for NIEHS to be engaged in the following areas? What are the roadblocks? (2.A) Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

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With the recent emphasis on No Child Left Behind and the "basic" subjects of reading, writing and mathematics, it has become increasingly difficult to convince teachers and administrators that they should make room for EH content in an already jam-packed curriculum. As a result, those of us engaged in EH education have generally chosen to partner with teachers, schools and districts that are already open to including topics such as EH - in other words, we tend to gather the "lowest hanging fruit." Abroad a national mandate to emphasize human-environment interactions in both primary and secondary education is needed. This might best be accomplished by partnering with other national groups with similar education reform goals, such as the environmental education (EE) movement. Perhaps NIEHS could piggy-back on the "No Child Left Inside" initiative, lending support to their efforts in exchange for ensuring that EH concepts and issues are more routinely seen as integral to EE. Another possibility is to forge alliances with the health education community, breathing life into a subject area that is increasingly being side-lined in favor of the "basics." Rates of diseases such as diabetes, obesity, and asthma - diseases that have a recognized environmental component - are on the rise. It seems a logical partnership to support efforts to revitalize health education while making sure it encompasses issues such as indoor and outdoor air quality and the consequences of living in a poorly designed, car-centered environments. In terms of the general public, I think that there are natural affinities with groups working on other environmental issues, such as global climate change, sustainability, and "green" architecture and urban design. There could be a concerted effort to develop a series of PSAs around the connections between these issues and human-environment interactions.

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The NIEHS has a wealth of K12 educational materials available to schools that should be drawn upon for their natural application to lay adult audiences: community groups, policy makers, at-risk workers and their families and of course for the education of the media, attorneys and judges. The new 'Partners for Environmental Public Program' should use this opportunity to play a needed role in delivering of public health knowledge to school children. This program can bridge barriers that exist a between a community and its schools. Families must trust that their schools are good and healthy places for their children. The need to improve school accessibility exists and is documented in low income neighborhoods, in rural areas and in large school districts (some might serve fifty languages to communicate with parents). Schools can be a source of environmental health risks. The costs of improving schools is often well beyond community resources and there are no federal mandates that demand a standard of health. Our children are a vulnerable population they spend a significant percentage of their time within school walls. To many parents and guardians today, the school walls appear impermeable. Simply put: a) excellent materials exist already (via education programs and curriculum, depts. of health, institutes like CDC, NIEHS) and should be optimized. Attention should be paid to update these. Attention should be paid to improve their use for a range of languages. Likewise, attention should be paid to improve use for range cultures. b) This new program can break through barriers that exist between the institution of school and the (families) they serve. One of the pathways is to leverage public health services/contacts that work with families have in place. One of the tools is using the 'common ground' type of language (not unlike the ALA adage about if you can't breathe not much else matters?) – Certainly at times, our environment is our health.

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There is a lot of innovation happening in science communication. There are many new efforts that tap the power of new information integration, visualization and communications technologies (e.g., Interactive/Participatory GIS, GRID technology for federating databases and applications, interactive multi-media including 3-D visualization, video-conferencing, collaborative groupware, on-line interactive mapping, and artfully-crafted, multilingual stories linked to dynamic “learn more” knowledge maps.) I can provide references if that would help. While these resources can be very useful for education and outreach, the way in which they are developed often runs into roadblocks. Road blocks to using such technologies often result from a “build it and they will come” mentality (i.e. investment in the technology infrastructure without adequate input from user communities). We learned our lesson on this score building the Hurricane Katrina-Rita Grid with NIEHS funding. The solution to this is a more mature and sensitive approach that can be summarized as the “socialization of collections.”

A major research challenge in the development of data management infrastructure for PEHP education and outreach purposes is the concept of socialization of collections. When a collection is formed, the curation team that assembles the collection has an explicit purpose in mind that defines the records that will be included, defines the authority model for assigning importance to the records, and defines the semantic terms that are used to describe the records. These properties constitute a social context that the curators impose on the collection as it is being formed. However, the users of the collection have their own unique social context. The users are members of multiple social groups, each with a different perspective on what constitutes an authoritative source, which records should be included for a collection to be complete, and which set of terms should be used to describe the records.

The mapping from the social context assumed by the curators who develop a collection to the social context of the users of the collection constitutes the “socialization of a collection”. The mapping between different social contexts is a major challenge in the development of planning for a region that has multiple social communities. For the planning effort to succeed, each community will want their social context to be represented within the reference material on which the planning decisions are based. Thus there is a synergy between the planning process, and the infrastructure used to support the planning process. Major new developments are taking place in this arena. In part as a result of new more userfriendly and participatory technologies ([A scientist] at SDSC has a lot to say about the concept of the Socialization of Collections, I can put you in touch with him if you like).

One neat effort underway at UCSD is called scivee.tv –a video content site [www.scivee.tv](http://www.scivee.tv) - focused on both pubcasts and general scientific video content. Pubcasts integrate video with open access literature. [http://www.scivee.tv/scivee\\_overview](http://www.scivee.tv/scivee_overview) provides a video description of what they are doing. The site has got a lot of press and eyeballs on it. This could be leveraged for PEHP. [A scientist] is the guy doing this work. I can put you in touch with him if you like –or you can contact him directly.

Other generic sites along such lines include: FORA.tv (a kind of UTube for scholarly video) FORA.tv delivers discourse, discussions and debates on the world's most interesting political, social and cultural issues, and enables viewers to join the conversation. It provides deep, unfiltered content, tools for self-expression and a place for the interactive community to gather online. <http://fora.tv/aboutfora.php>

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Our RTC and COC at UCSD is also developing multimedia tools for capturing and sharing scientific content. We use flash. You can see an example of this where we joined our SBRP forces with other campus initiatives concerned about toxicants: SEE: <http://renew-sd.org/>

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The approach to informing the target audience is the process. The Focus four hazards project that the IUOE National Training Fund, under an OSHA Susan Harwood grant, is currently conducting is a good pilot to use for advancing training and information to individuals—this is the outcome you ultimately want to achieve. This process recognizes the utility of the e-learning (and use of technology) approach but is significantly different. Training modules are used to create toolbox-tailgate type talks that are then captured in a compressed audio format, will be available for download from the NTF website as an MP3 file or Podcast. The Podcasts can be used as stand alone tools, and once acquired can be used by the individual for hazard identification and control. By using established networks, such as the NIEHS WETP and unions this information can be distributed directly to not only workers but to targeted stakeholders or entire communities. Using the same type of approach, this networking can be used by other organizations or systems to reach an individual in any target audience. Labor unions could encourage their local unions to allow public access to websites where these downloads could be obtained. Linking of the different systems would be a barrier that could be overcome, but would require intervention and guidance by some coordinating agency (NIEHS). Because construction workers typically move from one job site to another working for one contractor and then another, wherever the work is available, they receive vital safety and health information very infrequently, maybe only once. This has created one of the main barriers to overcome, getting the safety and health information to the workers in the field that will help them perform their work skillfully and efficiently. This can also apply to other mobile audiences. Another barrier is often infrequent discussion by the various populations or current or prevalent safety and health issues and people frequently become complacent about them, not seeing them as every day dangers in the workplace or at home. The process involves identification of a particular concern or environmental hazard, developing the training and information to alleviate it, getting it disseminated through an established network, and conveying it to the individual in the target population

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One area of concern as a potential roadblock is the question of "We have exposure data, what do we do with it now?" This question is particularly pertinent for the policy makers, epidemiologists/health systems protection specialists, and researchers. This presents an excellent opportunity for engagement of NIEHS; how do we quantify the action levels, do the results truly represent a hazard with immediate implications or are they simply measuring a now background level of material for that representative area and/or population. From these action

levels, should this type of testing become a legislative priority for routine screening (e.g., newborn screening or blood lead testing for infants and children) or is additional research needed prior to legislation. A serious question that is often asked is "Do we really want to know? How do we stop panic?" Once these questions are answered for the analytes of interest, development of health care professional education may require stronger partnership with national and state based training organizations particularly with certification and continuing education. NIEHS training educators and/or facilitators for this training presents an excellent opportunity for further partnership with these organizations and programs. The development of a training curriculum can utilize partner organizations to provide lay public, students, and teachers regarding the program and its impact. Limitations on publication or release of data is a potential roadblock; NIEHS may stipulate the publication of results, project progress, and associated work as part of the project to overcome this roadblock.

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Dissemination of the tools available needs to occur in addition to updating, evaluation of the tools is critical. NIEHS can assist with this activity. Nurses need to have tools for use in the homes as well as in all areas where patient education occurs.

Policy makers need to be education to assist in national chemical policy reform to mitigate chemical exposures and resultant public health effects.

Guides for environmental friendly purchasing for use by lay public as well as professions need to be developed and distributed.

Guides for green building and green cleaning can be helpful tools for the public to utilize at home as well as for business so the work environments and built environments are clean.

NIEHS should work with nurses in addressing the most vulnerable populations by increasing assessment tools, educational programs, and prevention activities.

NIEHS should convene a workshop for health professionals on the modes of advocacy for environmental health - zoning issues, local/state/federal legislation and regulatory mechanisms. This would not be a program to support any specific bills/regulations but rather a program to enhance health professionals skills to help translate emerging science into effective, informed policies and regulations.

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NIESH should convene a meeting of national nursing leaders, including researchers and educators, to encourage and promote research engagement in environmental health as well as to develop educational interventions. As an example, broad dissemination to the nursing community could be achieved through web-based, on-line content and tools. Further, recognizing the growing and emerging science about environmental health pollutants impact on human health, nurses should be engaged in reducing exposure through environmentally-preferable purchasing in their workplaces (from hospitals to schools and homes they may visit as community-based/public health nurses.

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Based on our past successful experiences in education and outreach, we feel it is important for NIEHS to continue to promote professional development for teachers. We found an effective way of educating a larger public through teachers from across the state of Maryland and beyond who brought the knowledge of environmental health science to their classrooms and into their communities.

o For seven years, MPT partnered with Johns Hopkins Bloomberg School of Public Health to plan professional development experiences for Maryland teachers, which included a 4-day Institute in which scientists, doctors, researchers, and master teachers presented information and lesson ideas in the areas of lead and other toxic substances, air pollution (indoor and outdoor), water quality and pollution, cancer, obesity and nutrition , and climate change, as well as other topics.

o Teachers from across the state of Maryland were engaged and receptive to the new knowledge and eager to take the information back into their classrooms and communities. Additionally, the opportunity to hear directly from scientists made the experience unusual and exciting for the teachers.

o Educational resources were developed to support the teachers in bringing the information from the professional development Institute to their classrooms, including lesson plans, career-focused interviews and web-based interactives, all of which are available online. Maryland State Department of Education (MSDE) and the Maryland Department of the Environment (MDE) aided in the development and dissemination of some of the products, which resulted in links to the materials from the MSDE toolkit for teacher use and the development of a series of lessons on lead poisoning prevention publicized during MDE’s lead poisoning prevention week in Maryland.

o The partnership was instrumental in MSDE’s incorporation of environmental health outcomes in the Maryland High School Core Learning Goals. Environmental health issues were also incorporated into the MSDE K-8 online toolkit.

o Evaluations done of the Institute indicated the following:

o Teachers’ content knowledge increased

. 39% of teachers had some content knowledge before the Institute, compared to 91% after the Institute

o Teachers felt the information was valuable and practical.

. 75% found several aspects of the experience very or quite valuable

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. 85% reported using information provided by the scientists in their lessons

o Teachers’ classroom instruction changed as a result of the Institute

. 80% of the participants developed lesson plan(s) based on the material from the Institute

o Anecdotally, teachers reported that they

. “were better able to see the connection between environmental health issues and the subjects taught”

. “were better able to convey important information about environmental health to students”

. “noticed a change in students’ behavior when studying environmental health including greater participation, interest, and understanding”

Roadblocks?

o Loss of dedicated funding to continue professional development for teachers and to develop additional resources to facilitate teaching of environmental health in the context of the current curriculum is a major impediment to the engagement of teachers in these important issues.

o Curriculum and/or testing requirements may not allow teachers time to deviate from set state or county-mandated standards

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The California Air Resources Board begins each meeting with a review of research finding related to air pollution and health. NIEHS needs to offer to make these kinds of presentations regularly to state and local agencies (or provide information and assistance to state and local agencies so that they can do it themselves).

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Opportunities to be engaged:

local forums for education & training

On-line learning opportunities

Web-casts

Funding for nursing education in EH & for research

Data clearinghouse for EH

Road blocks:

Cost/ Time/ Access/ lack of equipment

Nurse & Nurse Faculty shortages

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Interacting with non-research and non-governmental groups provides a great opportunity to leverage resources and interests. Unfortunately this can be difficult because of the different goals (information/advocacy) of different groups. Fortunately, NIEHS centers are well-respected as objective sources of information.

The net sum of NIEHS-funded research points to the need of a REACH-like system of regulating chemicals so they are carefully evaluated before they come on the market. Being able to

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synthesize all the past and ongoing research threads that show why this is a prudent approach and to inform policy makers seems like a critically important role.

Also, the decline in budgets of federal agencies and the nature of env. health issues means that increasing responsibility for prevention falls on local and state governments. NIEHS should take the opportunity to help develop their capacity.

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Providing community members and non-profit organizations with materials on the cumulative impacts of multiple emission sources on health in an easily-understood manner, perhaps, as a power point presentation, would be extremely helpful. It would also be helpful to have a community liaison between NIEHS and the states and localities to assist with presentations to policy makers on technical environmental health information.

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NIEHS has played an essential role in this arena in the past, supporting community-based and regional environmental justice programs as well as local and national worker education programs. The successes of these programs have been documented in Environmental Health Perspectives and other journals and lay the groundwork for new initiatives.

Opportunities exist to expand on these previous and existing programs to create comprehensive programs that bring together researchers, educators, community and labor perspectives in community education and community-based research programs that can influence policy initiatives.

One roadblock has been the need to evaluate programs using quantitative, short-term methods; e.g. the number of people trained rather than community empowerment, longer-term relationship building and policy change.

NIEHS could support creative initiatives that integrate: 1) worker and community education that also solicits ideas for interventions from those most affected, 2) interventions whose effectiveness is evaluated by both researchers and communities, 3) education on policy advocacy and involvement by workers and community residents in advocating for policy change in the workplace and community.

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In general, it is important to create educational and outreach materials about indoor environments. Our specific recommendations for housing quality and early childhood education programs are below.

Housing quality: Need to work with housing providers, community organizations and directly with families to:

- raise awareness about health effects of housing quality
- provide easy-to-implement, low-cost strategies for improving housing quality

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Also need to work with policy makers to create effective housing policies that improve housing quality for low income families, especially in inner city and farmworker populations. The main roadblock we foresee in this endeavor is working with housing providers.

Childcare setting: Need to work with both formal and informal childcare providers as well as with parents to:

- raise awareness about the importance of children's environmental health
- train providers on environmental health safety for young children
- train parents on important environmental health topics for young children and give them strategies for working with their local child care provider

Also need to work with policy makers to create policies for childcare providers about children's environmental health. One of the roadblocks in working with childcare providers will be identifying and working with informal childcare providers. This type of provider is likely to be common in areas of greatest need, i.e. low-income.

Finally, it is important to make educational and outreach materials easy to disseminate by making them available on the web.

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A good opportunity that needs attention and energy is Public service announcements on Cable TV Public Access Channels. EPA has TV and Radio spots already produced to educate the public about the lung cancer risk of Radon in homes. Contact EPA to send you a DVD.

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Need greater scientific assessment and ability to communicate difficult environmental public health concerns with policy makers and healthcare professionals. Conflicts arise between regulatory enforcement and economic interests which are difficult to weigh without good research data. Example: establishing policy on idling laws and enforcing same (How? Who? Why-what is the health benefit vs. the detriments of shutting down diesel engines for busses, trucks, etc. Exposure control for cars idling may be a social issue; mechanical impacts of idling of busses and trucks may include infrastructure changes)

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Bring together nurse experts in public health and other nursing fields to develop materials for public health education. Make available the best and evidence supported materials for all nurses to disseminate. First educate the many nurses that are not aware of the strong links between environmental exposures and disease so that they can be accurate informers for their clients.



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NIES should ensure that nursing education includes sufficient course work to fully inform the upcoming graduates in the field. Many programs have not integrated this content into their curriculum. Skills in environmental health are not well developed among faculty and this will require concerted national effort.

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EPA should extend its working knowledge and expertise in Community Based Participatory Research and serve as trainer to locals.

EPA needs "practitioner" advisory group composed of professionals who, on a daily basis, deal with community level exposures, founded and unfounded concerns, public/private conflicts, financial, political and cultural conflicts of interest, community-based risk assessment, risk communication and policy compromises.

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Students/teachers: Develop partnerships with science and math teacher groups. This will get the information into the correct places.

Health care: create CED type units that contain the information that you need to disseminate. That way these professionals are getting something for the learning, incentives.

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This area of potential public health impacts on existing populations as a result of Smart Growth Urban initiatives has not been widely discussed. Often it is simply assumed that the new projects being proposed will essentially automatically result in improvements in public health. In many cases—on a site specific basis—that may be a valid assumption. However, such a result is not universal and a well documented failure—one that impacts public health severely as an unintended consequence—will likely have negative impact on the future of Smart Growth initiatives.

Therefore, an educational and outreach program to the groups mentioned above and to others could go far to facilitate consideration of existing environmental exposures and how to eliminate or reduce them as part of the Smart Growth initiative.

Potential roadblocks include a shortage of available monitoring information for locations that provide a comprehensive environmental scan. In addition there may be resistance on the part of project proposers (for example) that such an approach is simply a delaying tactic holding back a project. Developers and some cities may fear the curtailment of redevelopment projects put together to support economic growth. But long-term economic and environmental health will necessitate closer examination of the potential public health and environmental impacts of such projects.

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I feel that educational and outreach materials developed for lay audiences and policy makers would do the most good.

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Educational programs for state legislators to help them understand the limited opportunity to identify causes from reported disease clusters. The program would help them to understand the nature of risk and that a substantial reduction in risk could be gained by personal behavior change.

Educational materials to help communities evaluate risk from varying sources.

Educational materials and methods to help individuals calculate their health risk from both individual characteristics (e.g., age) and group-level characteristics (e.g., rate of disease in the community).

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Use trained lay workers (Promotoras) themselves to conduct train the trainer sessions

Increase academic training as part of the health professions program and not as an elective

Coordinate with all federal agencies for a unified effort as well to maximize services, operations and resources (EPA, CDC, NIH, HHS, HRSA, ATSDR) and engage the private and advocate groups such as the physicians for social responsibility and groups like National Hispanic Medical Association whoa are working on local partnership effort to improve education and promotion.

Invite policy makers to the local areas especially the US-Mexico Border to visit, share and learn about outreach efforts. A special training effort conducted by the city of Laredo, Texas Health Department through a Border 2012 EPA project was to convene a workgroup of universities, state agencies, local providers and the Texas poison control centers to review materials for providers and has developed a web based syndromic surveillance training tool that was sent to over 220 providers for review with the provision of MEUs

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(1) Because waterborne disease involves public and private water utilities and perhaps even builders, plumbers and manufacturers of water heaters and plumbing equipment (providing showers), there is a question of liability that is a major roadblock in recruiting water suppliers.

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(2) There is a great need for the development of educational materials to educate builders and plumbers (through the local National Association of Home Builders), manufacturers of water heaters (through their trade association), and county, regional, and state public health professionals.

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Scientifically based analysis of the relationships between individual choices and health outcomes.

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Our experiences with a shared responsibility and shared development of a package of materials has been exceedingly cost-effective and exceedingly productive. Each partner took the lead on an area of EHS to develop materials, strategies, programs to address the issues with targeted audiences. That lessened the load for each but magnified the impact for all.

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Community planners and designers need materials like a basic 10-15 slide powerpoint, a one page fact sheet, and perhaps a small brochure that can be handed out to clients and at public meetings. Perhaps NIEHS could be involved in the creation of such "collateral" publications.

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• Lay Public. The lay public seems to respond to “science celebrities” who can translate scientific information into information that is interesting and relevant. Science documentaries such as Alan Alda’s Scientific American or other documentaries narrated and endorsed by celebrities (e.g., Leonardo DiCaprio on climate issues) seem to get the attention of the public. Surely there are ways to start small with this, perhaps through NPR Science Friday’s or PBS’ NOW. These folks are always looking for story leads.

Branding of EHS issues ?

Roadblocks: The scientific “voices” in the public sphere simply do not have the charisma or audience to reach the lay public. There also seems to be a growing division between environmental scientists and the research they are doing and the public’s perception of how this research matters. Issues of environmental justice must be forefront. An additional roadblock is the reluctance of scientists to make definitive public statements on scientific or public health questions.

• Policy Makers. Policy makers need answers, preferably yes or no! Clearly science is rarely able to provide clearcut answers, however there is a need to provide advice to policymakers that is simple, provides relevance, context, and uncertainties. One immediate way to improve this area is to provide research briefs that are actually brief.

Roadblocks. Roadblocks to providing policy makers with information is that often providing such information is misconstrued as “lobbying” when in fact is it not (lobbying is in the context of trying to push forward specific legislation). More importantly, a road block to providing information to policy makers is that scientific policies and priorities are politically driven (e.g., Climate Change, mercury, pesticides, pharmaceuticals). An additional roadblock is the reluctance of scientists to make definitive public statements on scientific or public health questions.

- Researchers. Researchers currently engaged in environmental health research can be effectively engaged through listserves, websites, and via EHP. EHP should continue to include features that highlight individual researchers/projects in all fields of environmental health science. Researchers not engaged in environmental health research represent a different audience. The challenge in engaging these researchers is how to engage them in thinking about and acting on environmental factors that are linked to health outcomes. One way to engage these researchers is through the use of collaborative grants and workshops. RFAs can be structured to promote collaborative research across disciplines.

- Health care professionals. An effective way to reach health care professionals is through Continuing Education Module style educational materials. These maximize take home practical environmental health messages in short amount of time

Roadblocks. Reaching health care professionals is difficult because of time issues, the reluctance of practitioners to incorporate new information into the short time they have with patients, and the relevance, or perceived lack of relevance, to the majority of cases seen. Health care providers rarely have time to read journals outside of their specialty.

- Students and Teachers: Above the Fold-type news feeds (<http://www.environmentalhealthnews.org/>) would be an effective way to give teachers a quick overview of current environmental news. A listserv they could register with for a daily or weekly email would be a way to get this information out. Maintaining the student edition of EHP is essential.

Roadblocks. Teachers must cover certain topic areas in their curricula. An effort would have to be made to identify these topic areas and try to incorporate environmental health into them.

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Roadblocks are nearly always lack of funding that is consistent and prolonged and flexible enough to fit the work to be implemented. Improved use of radio to give information.

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The information networks already exist. They need materials, a national strategy, and oversight to assure consistency and progress. The roadblocks are familiar: resources and priorities. Until #1 above is addressed, there will be no meaningful progress.

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NIEHS should focus on the production of multimedia materials that target these audiences through different means and outlets, ranging from radio shows to videos, Tv shows to podcasts. The emphasis has to be on new technologies that enable communities to access information easily and cheaply. The production of printed materials should continue but it has to be associated with other electronic formats. In addition, NIEHS should encourage the linkage between science and arts in the educational materials produced for students, lay public, teachers, etc.

Many of the scientific materials produced are boring, difficult to understand, and thus not useful to non-academic audiences. NIEHS should network with graphic designers, web developers, and media producers to expand the types and formats of materials available to the public.

The main roadblock may be the lack of expertise in the Institute to link biomedical science with artistic creation. It is not easy to do and requires dialogue between scientists and artists, not an easy proposition.

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I think that it is important to foster interactions between research investigators, students, and public to openly discuss the current research projects involving environmental influences on health. It is important to provide ample opportunities to make these connections and provide grants and funding opportunities to researchers willing to help improve important collaborations. If researchers have the resources available to them, I believe that many are interested in pursuing the development of outreach materials and would desire to get more involved in the community. I also think that feeding the pipeline of educators and researchers is very important. Although structured very differently, current scientific projects can be easily translated into environmental health curriculum and seminars for middle, high school and college students. However, current funding for performing outreach to middle and high school students is limited. Focusing more funding on middle and high school students reaches not only the students and teachers, but also the parents of those children. Diseases with important genetic and environmental causes are being discovered, and it is important to continue dialogues between all community members so that communities become aware of the hazards and causes of diseases within their own personal communities. Partnering research with community engagement will help those in the community be able to better take control of their personal health. I believe that role of gene-environment interactions in environmental health is becoming increasingly important. I think that this is a novel area where communities and various audiences can collaborate to gain a better understanding of how these complex interactions affect overall health.

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Opportunities:

- 1) Creating educational environmental health education standards and how other educational standards can be addressed through environmental health standards would be a opportunity for NIEHS to promote EHS in K-12 education

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2) Developing materials using emerging and innovative technology (podcasting, gaming, cell phones, etc.) to promote more environmental health awareness

3) Continuing to support and disseminate environmental health sciences education. NIEHS should continue to be a leader in promoting integrative learning and teaching.

4) Parenting practices. Are their specific parenting practices that could be addressed using environmental health issues? How can parents protect their children better from risky behaviors?

Roadblocks:

1) Other than the obvious of funding, the lack of awareness of what environmental health is and its importance in protecting the public's health (within many areas, e.g., education, health care, industry, etc.)

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Opportunity: increased community participation  
Obstacle: distrust

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Funding should be directed towards innovative information products or research efforts to develop and evaluate the effectiveness of information resources and delivery mechanisms. Many printed resources are presently available, and are readily available to an unprecedented extent through the web. Information resources in a field like environmental health can quickly become dated. Therefore funds would be better directed at activities that provide new information about effective communication or to develop novel information resources such as GIS based resources to address environmental issues at the local level. Private funding can be sought to develop educational and outreach materials whose effectiveness is proven

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NIEHS has a great opportunity because it can funding equitable research partnerships between university investigators and CBOs that have demonstrated a capacity for conducting successful community-driven research and/or CBPR. It may also be good to reach out to and fund fledgling CBOs directly through a small grant awards program to help CBOs during their start-up phase as they develop capacity to address local environmental exposures that impact the health of low-income residents living in communities of color. The roadblock is identifying true partnerships between universities and CBOs and making sure that the relationship is not exploitative of the CBO.

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47  
Existing education infrastructures such as the USEPA training centers and teams of educators exist and are actively working on the expansion of the materials and examinations associated to educate the public AND contractors who provide the services. One leader that comes to mind is

RFI Responses: Question 2A – Where are the new and/or best opportunities for NIEHS to be engaged in the following areas? What are the roadblocks? (2.A) Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

William J. Angell who directs the Midwest Universities Radon Consortium out of the U of MN St. Paul and is co-chair of the World Health Organization's committee on Prevention and Mitigation.

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48

Information is needed for local policy makers and land use planners working on redevelopment of brownfield sites where general and sensitive populations may be exposed.

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49

Lay public --opportunity: make current state-of-the-art knowledge available in accessible language/format, establish agency as a resource to the lay public. Include the underrepresented where impact is high, but visibility of the improvement may be low. --roadblocks: information needs translation (from technical to several levels of understandable and to many languages), must identify appropriate distribution networks (not just the internet) Students and Teachers -- opportunity: encourage interaction of NIEHS scientists with teaching colleges; share successful products with teaching organizations; integrating materials into medical and public health curricula --roadblocks: convincing scientists to insert information at the grass roots of education must be recognized as a valuable contribution Healthcare Professional --opportunity: service delivery planners must be trained in emergency planning --roadblocks: accrediting bodies must make it an actionable part of approval (accountability) Researchers (no input...but outreach to the lay public and students/teachers will foster future researchers) Policy Makers --opportunity: increase recognition of importance of emergency planning --roadblock: too many agencies involved for unified message

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Lay Public: Create engaging web-based materials that can be used to communicate information about environmental health research to lay audiences. Specifically focus on "translational" research that has progressed from basic science to (potential) clinical applications. Students/Teachers: NIEHS should continue to fund projects to create, evaluate and disseminate educational materials for K-12 (and college) level students. NIEHS should continue to fund teacher professional development initiatives to engage teachers in learning where environmental health fits into their curriculum.

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The Web still is an untapped resource for engaging the public in environmental health sciences issues. Some web-based educational materials do exist, but many more are needed. In addition, teachers still lack science content knowledge related to the general field of environmental health. With so many US science teachers teaching out-of-field, or teaching without even a minor in a science field—science teaching, in general, is not of sufficient quality. Teaching about environmental exposures, health, and related topics requires a level of integration across subject areas (biology, chemistry, environmental science, health, etc.) that simply is not possible for many teachers. In depth professional development on these topics will be necessary if

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teachers actually are to use real-world examples from environmental health to stimulate student enthusiasm and learning.

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52

NIEHS CBPR, EJ, and other projects have created a wealth of public information materials in addition to scientific publications. While scientific articles are relatively easy to find through the existing indexing systems, public information materials are not. As a result, projects may end up reinventing the wheel. This process is costly and inefficient, and results in development of ad hoc outreach materials that do not take advantage of the contributions of other projects. Our own work would benefit from access to an indexed library of the best public information materials developed with NIEHS funds. In addition, we welcome the opportunity to contribute material that we have developed, and see this as a way to familiarize other projects around the country with our work.

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Development of Educational and Outreach Materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups? NIEHS can connect to these groups by building stronger relationships with organizations such as APHA particularly the Environment and Epidemiology Sections and Community-Based Public Health Caucus and National Environmental Health Association (NEHA). NIEHS should provide funding for a partnership between these groups in order to provide more information to health professionals and researchers about issues in environmental health. NIEHS should think out of the box and work with major newspapers such as the New York Times and Washington Post, outlets such as USA Today, Time Magazine, news outlets like CNN and environmental magazines like Grist to support environmental reporting and weekly or monthly columns by NIEHS and non-NIEHS scientists on environmental health issues. Other outlets that reach communities of color such as Ebony, Jet, Essence and BET for example can also be included in the partnership. NIEHS can work with their writers to produce outreach materials to connect with populations of color through print and TV media. Environmental advocacy and social change groups such as the Environmental Leadership Program and NRDC could be included in the partnership. NIEHS should also connect with CDC, EPA, and NACCHO who are working to develop environmental health indicators. Education and outreach materials could be developed with the partners on these topics and other related topics.

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- \* funding for environmental health professionals on staff of community-based organizations (CBO's)
- \* fellowship placement of or other mechanisms to help recruit environmental professionals on staff of CBOs
- \* capacity building funds from grants to CBOs
- \* need access to economists, health policy and social scientists, and other experts in centers to adequately translate findings
- \* funds for communications professionals to help develop messaging in order to disseminate environmental health findings



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\* provide environmental engineering expertise to CBOs in order to help with review and development of practical mechanisms to implement programs/policies to prevent environmental exposures

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Opportunities: Programs with a public radio and TV “NOVA” style of reporting are engaging to the lay public and useful as educational tools.

On-line continuing education programs for nurses, (limited to one hour), are useful for staff nurses with both an interest in the subject and a need for continuing education. CDC has many such programs. A series of topics in a brief format (1 hour) would engage the staff nurse and provide an outreach opportunity. And allow nurses to then pass the information forward.

Road blocks: for staff nurses roadblocks are programs that are too long.

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Integrate, don’t segregate. NIEHS should not be moving towards consolidating community education and advocate involvement in research into a single grant program. These objectives should be integrated into all grant programs / funding mechanisms, perhaps some more than others. If the ultimate objective is to improve public health, then each grantee should be accountable in some way to identify / demonstrate the public health significance of their research and to make the findings available to the public.

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The NIEHS has been an acknowledged leader in the development of educational materials for many years, particularly those targeting K-12 students and teachers. Many fine, effective educational programs, targeting a range of audiences, have been developed by a variety of grantees, including NIEHS Center COEP/COECs and EIC grantees. It seems reasonable, at this juncture, to reassess the prohibition on the development of K-12 educational materials by NIEHS Center COECs and to allow experienced and successful programs to continue and grow. These types of programs can not only impact scientific literacy and environmental disease prevention, they can also contribute to the recruitment of new, young scientists to the field. The idea that these recruitment activities can be successful when they target only high school juniors and seniors has been effectively repudiated by many studies.

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Over the years, a lot of outreach materials have been developed via NIEHS funding mechanisms and much of it was captured in the clearinghouse. A next useful step could be to review the materials and identify the best ones for each of the different audiences and/or chemicals/topics. The best materials could be disseminated in a national-level coordinated effort like described above. The coordinated effort could also include targeted writing, interviews, speaking engagements etc. to disseminate important general information as determined by the group.

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New materials would likely need to be developed to address the specific local and regional needs (as identified by COECs and/or grant awards) and the audiences would vary depending on the goals of the project. For example an EJ grant focusing on zoning issues would likely have the lay public and policy makers as the main audiences. A project on a unique chemical exposure in a school may need to develop educational materials for teachers and students. As an aside, No Child Left Behind (NCLB) has been a barrier for the implementation of educational materials, but the lack of public support for NCLB will likely result in its demise, thus re-opening opportunities for the incorporation of unique curricular materials. What will not (and should not) go away is the accountability to learning (i.e. developing and advancing key skills like math, scientific thinking, writing, etc.) while learning about a topic such as EH. Development of new (or use of old) education What should be avoided, at least in these formative stages, is a prescriptive approach defined by NIEHS (e.g. saying which materials can and cannot be developed or which audiences can and cannot be reached).

Although NIEHS, to a certain degree, defines EH research directions, outreach is a process defined by community needs. With that in mind, there is no reason to keep re-inventing the wheel (e.g. having 20 pamphlets on lead developed on different grants but all saying essentially the same thing), which is why a well-defined dual national/local public health approach may be useful. Again, the national activities could focus on common national concerns and the local would address unique, specific issues. The national outreach group could also help local projects utilize existing materials, where applicable.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

- \* Opportunities: Best practices to be highlighted and gathered overall
- \* Already established training manuals, training programs, and advocate trainings by key partners that have had a successful history in this arena (CEHN, NEEF, PSR, etc.)
- \* Lay public: There is still a huge gap between the connections to environmental health and public health (existing materials need to be better distributed and linked to their daily priorities)
- \* Students and Teachers: There is still a need to have our national school system connected to the realities of environmental injustices happening, causing resulting negative impacts on health and educational opportunities. There are various models of best practices among school systems where lessons learned can be modeled (national and regional coalitions)
- \* Health professionals: A variety of organizations provide trainings and educational advocacy opportunities for health care providers. Tool kits, practicum examples, advocacy trainings, faculty guides, environmental history-taking modules, and train-the-trainer type of approaches.

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\* Policy makers - Examples of forward movement by some states and lessons learned (CA, MD, etc.)

Roadblocks -

\* Translation of educational/outreach material appropriate for each stakeholder population

\* Not much if any materials specific to day care settings and social workers. CEHN has the only national child care educational training kit available.

\* Great need to reach ALL health care providers as key in preventive health matters. Current efforts do not have the capacity to reach the vast numbers needed or disseminate key resources to providers in mass quantity

\* Staff and monetary resources

\* No agency responsible for the health and well-being for children's health in school environments.

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Roadblocks to progress in both of the following areas include: decreasing science and health literacy in the general public; lack of organizational commitment, time or resources; and narrow specialization in professionals or standard curricula. Development of Educational and Outreach Materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups? As new health care and public health professionals are trained, we need to seek opportunities to demonstrate the relationship between their specialty and environmental health. Conversely, for those engaged in basic environmental health science research, there should be continuing education that places research in the context of public health, people’s lives and the real world. The “so what?” question needs to be asked or “What are the implications for application or policy?” As more and more data becomes available to the public, we need to develop ways to interact with and assist them as they interpret the data. How can we cooperate with them, benefit from the unique knowledge and insight that they bring to environmental health problems and incorporate these new findings in our work?

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Opportunities: NIEHS should work in partnership with others already doing this work and build off of models already in progress. Provide funding to invest in webinars, conference calls, and online resource centers. There are so many environmental health materials floating around but there are several trusted sources of information in the environmental health community that have risen to the top. The Collaborative on Health and the Environment ([www.healthandenvironment.org](http://www.healthandenvironment.org)), Environmental Health News

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(www.environmentalhealthnews.org/) and Women’s Health and the Environment (www.womenshealthandenvironment.org) are just three examples. Working in coalition with these and other groups would be powerful and an acknowledgement of the human and financial resources already invested in these efforts. NIEHS could provide leadership and funding to develop new and creative strategies for moving this important information into low income communities and other communities disproportionately impacted by environmental exposures. Similarly, there are groups who have begun to develop materials for healthcare professionals and other groups noted above. Gathering these groups together and providing financial support for scientific “translation” and materials development is a key role that NIEHS could play.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups- Thinking ahead to avoid going thru IRB process again in order to develop these materials

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1. We continue to need to get the support from researchers working with advocates as true and equal partners.
  2. It is also a struggle to find advocates who can volunteer their time to work in a research center for two reasons; one is that these advocates are indeed volunteering and have many other time commitments. The second is that with breast cancer advocates who are also survivors, many are dealing with health situations that prevent them from fully participating.
  3. It is also very challenging to work with other centers when we are geographically so far apart and meet infrequently.
- Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

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NIEHS could sponsor training for COEPs aimed at translating research for low literacy populations. Health literacy training could be provided during the annual EH Centers meetings and other conferences/meetings at which COEPs are participants. Pursue opportunities for innovative methods of outreach, such as video for various communities.

-Focus training at conferences on effective evaluation methods. NIEHS could assign experienced staff to work with COEPs to enhance evaluation methods in their various strategies. (CDC and Harvard School of Public Health are currently partnering to provide this instruction on effective evaluation strategies for statewide lead poisoning prevention programs funded by the CDC.) -Enhanced focus on outreach to local health departments will increase outreach among health professionals and the general community. -NIEHS could help COEPs learn how to enhance their outreach to the general community through faith-based organizations.

What are the roadblocks?

\* Developing multiple versions of the same material to fit varied audiences (policymakers, general community, health professionals) -Developing new methods of outreach (such as video) can be costly.

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\* NIEHS grantees will have to expand their view of what "health professionals" are. At the EH Centers meeting last October, I was given the impression that several COEPs consider health professionals to be doctors and nurses. There is much outreach that can be done with the assistance and collaboration with local health department officials ? on various levels.

\* One barrier to one-on-one attention to COEPs as they develop effective evaluation methods is that NIEHS might not have the staff to accommodate this need for each COEP. I am not familiar enough with NIEHS's past efforts in enhancing individual COEP's efforts, so this particular strategy might have been pursued in past years.

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We have found through our NIEHS-supported project that the education and outreach tools that are most effective are those that are developed in partnership with the community that is the focus of the project. While there are a great deal of resources and tools in existence that contain valuable information and strategies for educating various populations, we have found that have been many of those tools don not use language or stories that resonate with the intended audience and therefore are underutilized (if they are used at all). Because tools that are modeled around popular education concepts and focus on peer sharing and learning have been most effective for our project, we would encourage NIEHS to support the development of these types of materials and tools.

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NIEHS should fully invest into the National Environmental Public Health Tracking Network. This is the one initiative that might be able to standardize and empower state health departments to more fully understand comprehensively both 2A and 2B functions.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups. NIEHS is already a leader among NIH institutes in developing these materials. In particular, EHP has created a great resource through the EHP Student Edition and the teacher materials. The quality of the materials is excellent, the only problem I have seen is in the distribution. In addition to using these materials to educate the public about environmental health, NIEHS could use them promote itself. It is probably a great time to promote NIEHS as the most trusted entity to whom the public can go with questions about the environment. Marketing NIEHS in this way through the educational materials that it produces can be a great way to promote its mission.

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Development of Educational and Outreach Materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups? Opportunities:

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Development of understandable technical information (fact sheets for adults, games/lab experiments for children) regarding general environmental concepts

Groundwater – watersheds, aquifers, contamination, plumes, etc.

Soil – silt/sand/clay composition, how composition affects contamination, etc.

Roadblocks:

Development of chemical specific reference materials for lay public would require extensive library of documents.

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72

Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups. Fostering interdisciplinary collaboration between groups that address environmental health sciences from varying perspectives and who traditionally do not interact. This could include groups such as tobacco prevention programs, public health departments, environmental health sciences center staff, ATSDR officials, tribal health clinicians, extension faculty and many others. While the objectives for these groups may overlap, their approaches are likely different on how to communicate or develop health education materials. Possible road-block: At risk populations and under-served populations should be highlighted as audiences for educational/outreach materials, but are traditionally difficult to reach.

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73

We see an opportunity for compiling existing research and producing “Fact Sheets” for many different types of environmental exposures. A roadblock to this type of project is the extensive amount of time it will take to compile and validate the research that has been completed and finding the human assets to do the work. Many NEHA members have expertise with assessing scientific studies and developing fact sheets and other relevant literature for public and professional use. Generally, products developed by NIEHS can be used by NEHA and translated into applied applications useful to environmental health professionals and practitioners.

You can't intelligently talk about outreach today without incorporating into your strategy some element of social networking web sites, interactive education, podcasts, etc. If NIEHS wants to get their knowledge out, they will have to give some thought to using these more contemporary forms of education delivery.

When creating education and outreach materials, we feel it is best to have the intended audiences participate in creating the product. Since this project appears to be directed to a wide spectrum of the public, it would be crucial to develop separate materials for the different audiences. For example, information for the healthcare industry needs to be created for those professionals and with their input as to what information is crucial to them. This is similar with the needs of community groups, who should participate in developing information that is useful for their needs.

NEHA's membership is comprised of many of the target audiences identified in this question, i.e., students and teachers, health care professionals, researchers, policy makers, and others. Rather than developing educational and outreach materials directly, NIEHS should engage organizations, like NEHA, that routinely develop and disseminate such materials to translate NIEHS research products into useful educational and outreach materials for environmental

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health professionals and other target audiences. One advantage of this approach is that NEHA members, who are the target audience, participate in the development of such materials and thus are better able to make them relevant to the needs of practitioners and other users. NEHA currently develops and offers educational and outreach materials in a number of environmental health areas to include: all-hazards preparedness - terrorism, indoor air quality, drinking water quality, onsite wastewater systems, emerging pathogens, swimming pools - recreational waters, environmental health research, vector control, food safety and protection, water pollution, general environmental health, workforce development, hazardous materials and toxic substances, and others. Also, NEHA’s professional journal, The Journal of Environmental Health, and its annual educational conference are other vehicles for disseminating educational and outreach materials. Recently, NEHA has started developing tools and programs to market the environmental health profession and influence workforce development. Both of these efforts involve developing educational and outreach materials and engaging various audiences.

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74

New/best opportunities: the use and development of GIS methods for mapping health disparities, environmental stressors and health resources. Such methods offer the potential for joint assemblage of maps and other educational materials, as well as the stimulation of dialogue among diverse stakeholders.

Roadblocks: GIS literacy and general literacy, although that would be a goal of the education. Also, differing perspectives and needs could be a roadblock if one attempted to include diverse stakeholders together.

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75

The time is ripe for pesticide materials to be produced for the farmworker. Because so many farmworkers are Hispanic migrants, materials need to be visual and have very few words. It might be timely for growers to distribute culturally- and literate-appropriate materials to farmworkers to alert them about pesticide exposure and safety precautions they can take. Educational outreach is also needed for healthcare professionals so they can identify pesticide exposure symptoms when they occur.

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Many successful popular education methods and curricula have been developed under the NIEHS EJ grant program, and continued support of the development and dissemination of these would be valuable in providing education and outreach on environmental health and participatory democracy for communities. Methods for quantifying the benefits of improved public health in monetary terms for policy makers would be valuable as well.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups.

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Best Opportunities: Academic faculty and staff who provide applied research and education to the general public through contracts are best positioned to respond to the needs of NIEHS and the applied needs of target audiences. Such academic contracts can target each audience separately and facilitate cross-audience dialogue and action. For example, the UNC Exchange Project (Dr. Carolyn Crump) is pursuing next-stage operations based on a 5-year NIEHS educational grant. The project is facilitating such homogeneous and cross-group dialogue to target systems level and policy change.

Road Blocks:

1. Sustained vision by NIEHS with projects building upon prior work in order to leverage high-level system or policy change at a statewide level.
2. When NIEHS provides such grants or contracts, it is useful for the funded contractors to meet and brainstorm challenges regarding access, data translation, political pressure, and market dynamics.

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NIEHS is engaged in many worthwhile areas. Our focus again is Brownfields, and dissemination of information & research about potential environmental hazards associated with Brownfields properties would be a very valuable area of research.

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For effective outreach network development what is needed first is a centrally housed and operated (up-dating and custom serviced) Internet information resource, which is made available to all of the affiliated partners. A system must be developed to facilitate the easy access to specialized questions by those partners. In this scheme the outreach manager play a pivotal role in building the network including new partners.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

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81

In our area (The Tar Creek Superfund site): the development of outreach materials for the public, students and teachers should continue, health care and research groups should form information sharing groups or panels. The Policy makers are so critical for our area since they make all the decisions about funding. Since the TC site has been researched for so long (put on superfund list in 1980) - some people wonder if the funding will dry up. The Tribe feels that since they will always be here (jurisdictional lands will never move)- that the research and especially the outreach need to continue.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups



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I think that this is an area in which NIEHS has been doing very well. I think it was a mistake to make outreach cores optional in superfund centers. It just is not justified given the current need to increase our skills at translational research.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups  
Research and outreach to policy makers and the lay public is woefully lacking. Any research done is worthless unless its results are communicated. Numerous studies have been done on environmental health concerns, but the results are unknown in the policy making community, leading to skepticism regarding environmental policy, and (more importantly) the funding and support of environmental health.

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Development of Educational and Outreach Materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups?  
I think grants to encourage development of these educational materials (helping people see cost-benefit of remediating the risks in #1) would be a great public service.

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NIEHS can provide funding to BSPI who will then research construction materials; design, build and test a prototype constructed to be tolerable for the chemically disabled. The research for this project is especially targeted to address the needs of low income children, the elderly and the general chemically disabled community. Although there has been a vast increase in the statistics of those living with MCS (multiple chemical sensitivities) and other chemically related environmental illnesses, the major roadblock to receiving funds for this research are due to a limited knowledge and lack of publicized information based upon the long term effects of MCS . A documentary will be produced recording the design, construction and testing process of the prototype to inform the public and generate awareness; educate future architects and support specialization in this field. It is important to record each stage of the development of the MCS prototype beginning with the interviews of the study participants and the medical professionals working with them. Background visual footage as well as information will be needed in order to show and tell the story of the adverse effects of modern technology on the human population. The selection of the land to build the prototype and each phase of the building development will also be part of telling the story because of the holistic process involved. The finished recorded project needs to be of the highest quality for the best production value. Phase I will consist of research footage that will be edited into the documentary project during the Phase II construction.

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a) Utilize college and high school students in developing messages for lay, students and teachers based on the information that the trained health care professionals have given them; researchers need to prepare 'bullets' of information to get the word to policymakers and other groups; barriers: time and politics; resistance to change

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

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Development of Educational and Outreach Materials for the following audiences: lay public, students and teachers, health care professionals, researchers, policy makers, other groups?

- Journalists are an important stakeholder that may represent an important area to focus risk communication.
- A road block is the lack of social science input in environmental risk research and risk communication design.
- Educational and outreach materials need to be community focused and targeted. Community advisors for our Asthma Center have been very adamant about this. They admonished us to tell the community about asthma findings based on the studies conducted in Baltimore – not just general information about asthma.
- Funding is a key issue – engaging stakeholders requires resources.
- There are not many people qualified and specifically trained to direct communication programs. We struggled to find someone with the requisite skills and cultural competency to lead our outreach. Thought needs to be given to the skill-set needed to be an effective leader in this area – then NIEHS needs to provide training resources to create a cadre of well trained professionals.

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91

It appears to me that molecular techniques will ultimately replace culture-based methods in water quality monitoring work, and I believe that the focus of such work will switch from indicator organisms to specific pathogens. And we will have to do more than test for mere abundance. We will need tests that focus on virulence. Finally, we will need to make the connection between the abundance of virulent organisms and public health endpoints. That will mean epidemiological studies, which are expensive.

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Development of educational and outreach materials for the lay public:  
The purpose of environmental public health research is to translate scientific findings into useable health information for those communities and individuals who are being

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disproportionately exposed to environmental pollutants. Specifically, effective education vehicles are needed to inform low-literate parents and families of environmental health risks to their children and recommend simple, low-cost methods for reducing harmful exposures at home.

Examples of current initiatives that ought to be continued and expanded upon include the following: a) the development of visually descriptive posters and take-home tip cards to display in local physician offices, free clinics, and private practices alerting communities to health risks for individuals exposed to common environmental pollutants. Accompanying take-home tip cards show how to reduce exposures; b) newsletters for study cohort families on the impact of environmental hazards on human health c) interactive web pages geared to individuals and communities most vulnerable to environmental pollutant exposures; describing environmental toxicants, related health effects, and how they can keep their exposures low.

Development of educational and outreach materials for healthcare professionals:

One of the best opportunities for the PEPH program to be engaged in is that of medical education. The severity of environmental exposures on child health has been well established by the scientific community. However, few actions have been taken to alleviate the many environmental health concerns that are currently affecting human health. There is therefore a direct need to effectively employ clinicians and health care providers as educators and community leaders to minimize the impact of environmental exposures on child health. It is the role of public health professionals to provide health care providers with the tools and resources necessary to provide effective education to their patients. Physicians have direct access to patients on a regular basis. They are a convenient and already established educational vehicle and they are respected among both the local and scientific communities. Together this allows physicians to effectively serve as the link between scientists, policy-makers, and those areas of our country that are being disproportionately affected by environmental health problems.

Examples of current initiatives that ought to be continued and expanded upon, include the following: a) Grand Rounds by scientific investigators to physicians of current scientific results and their relevance to medical practice b) provision of local physicians with new scientific publications and talking points for physicians to relay to patients that reinforce key health messages.

In additional, a relatively untapped opportunity to educate health care professionals is to develop formal relationships with professional medical societies, such as the Academy of Pediatrics. The Pediatric Environmental Health Specialty Units have been a good step in this direction, but do not reach the great majority of clinicians. There is a need for some type of professional training programs targeting clinicians possibly as part of their graduate medical education process.

Roadblocks: One of the primary roadblocks is that bridging clinical and public health approaches is difficult. Specifically, most physicians have less than ten minutes to spend with a patient. It is therefore necessary to develop educational resources that the patient can bring home with them and that will subsequently reinforce key health messages.

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NIEHS should convene a meeting of nursing researchers, national leaders in nursing research to encourage research engagement in environmental factors - i.e./disease outcomes as a function of exposures, best approaches to educational interventions for environmental health,

economics of prevention versus treatment. The outcome of this meeting should be a blueprint of how to best integrate environmental health content and education into all nursing education and ways to target current nurses. There is a need for several Environmental Health Nursing Research Centers in the U.S. These will serve all regional hubs for reserach activities, training and education and community support.

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A roadblock in the policy area is a need to better understand what are acceptable and unacceptable means of informing public policy on environmental health research. The NIEHS urges its grantees to demonstrate an impact on public policy and public health, but Center investigators worry about how far they (or the outreach program) can go to “make suggestions on what should be done,” as opposed to just “presenting the science.” Better guidance in this area is sought. We also urge NIEHS to develop more opportunities for Center investigators and outreach/translational program leaders to testify at Congressional hearings or conduct briefings of Congressional staff. In addition, it would be very useful for NIEHS legislative staff to keep NIEHS funded Center directors and outreach staff informed about the committees on The Hill that are most relevant for particular Centers. E.g., one Center might be interested in knowing about the committee that covers rail pollution, while another might be interested in which committees cover hog farms. Centers far from Washington, D.C. are particularly unlikely to be familiar with all the possible committees to which it would be valuable to disseminate research findings.

One way to encourage scientists to pay more attention to the public health and policy implications of their work might be for EHP to require that these implications be addressed in any research articles published in the journal.

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Educational and outreach materials for Healthcare Professionals need to be developed and disseminated, to apprise them of these domestic mercury exposures, many of which are at second-hand, from residual mercury left by some prior ritualistic mercury user. This means that a conventional history taking will not elicit any information about exposure from current residents of dwellings contaminated by prior occupants. The health care provider must be given some information on the prevalence of mercury use within the community where he/she is practicing, as well as the diagnostic tools to enable the practitioner to appreciate the subtle symptoms and signs of chronic mercury poisoning. One such attempt, “Metallic Mercury Exposure: A Guide for Health Care Providers”, is of minimal utility, as it is devoid of any quantitative indication of the magnitude and distribution of mercury sales, as well as having no references to the medical literature. (It can be accessed at <http://www.nyc.gov/html/doh/downloads/pdf/eode/mercury1.pdf>).

Education and outreach materials for the Research Community need to be developed, and better still, RFPs should specifically address ritualistic mercury exposure (indoor air mercury vapor levels, biomarker mercury studies of mercury absorption, and studies of the health effects these exposures, especially neurodevelopmental effects.) In contrast to the extensive literature on methylmercury exposure, there is a dearth of literature on maternal-fetal, infantile and pediatric exposure to elemental mercury.

RFI Responses: Question 2A – Where are the new and/or best opportunities for NIEHS to be engaged in the following areas? What are the roadblocks? (2.A) Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

Education and outreach materials for Policy Makers need to be developed, based on the clinical, environmental, and laboratory research outlined elsewhere in this document. It is virtually certain that large numbers of homes in Caribbean and Latino communities around the USA are contaminated with sufficient ritualistic mercury in their floors to raise their mercury vapor levels to the EPA’s evacuation level of 10 µg/m<sup>3</sup>. This will require major governmental funding to assess and remediate large numbers of contaminated homes, as there is no way to “make the polluter pay.” Policy makers have yet to formulate a response plan, let alone to acquire the logistical infrastructure to address serious mercury contamination of tens of thousands of homes in communities around the USA and Puerto Rico.

Education and outreach materials based on research findings need to be developed for the Lay Public. Materials detailing the likelihood of mercury contamination of housing in Caribbean and Latino neighborhoods, and the potential health effects of such contamination need to be made available to the public at large. Much of the education and outreach material developed to date has been addressed to ritualistic users of mercury, and fails to address and to inform the non-user reader of the dangers they and their families are exposed to from second-hand residual mercury left in the flooring of their dwellings by some prior ritualistic mercury user. One example of such an inadequate document is accessible at

<http://www.mercurypoisoningproject.org/pdf/booklet99.pdf> (NYC Department of Health “Azogue Vidajan Metallic Mercury Poisoning” (NYC Dept. of Health, n.d. ~January 2000)

No outreach and education materials directed at the lay public can be more than marginally effective until there is sound evidence that ritualistic mercury use results in adverse health outcomes. The three fundamental questions that must be asked, and then answered are:

- a) Is mercury vapor from ritualistic use present in occupied dwellings?  
(Measure mercury vapor levels in occupied dwellings)
- b) Is this mercury vapor absorbed by the occupants?  
(Measure mercury in humans occupying mercury-contaminated dwellings.)
- c) Does this absorbed mercury vapor result in any pathology?  
(Clinically work up exposed individuals for symptoms and signs of mercury poisoning.)

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NIEHS needs to be engaged in opportunities that support community-based forms of science and research, particularly those that focus on underrepresented and vulnerable communities. The best opportunity to do this is through CBPR and the development of educational and outreach materials. Often times the materials exchanged between professionals and researchers are replicated for use with youth and the lay public. However, these materials have been developed to disseminate information and are not designed to engage a different audience. It is essential that these materials be designed relative to their targeted audience and that the platform for dissemination be an integral part of their daily lives. Community-based organizations have the deepest connection and involvement with impacted communities and are in the best position to inform the design, content and implementation of educational and outreach materials.

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NIEHS (and other scientific agencies) should endeavor to overcome cultural gaps which separate the community from researchers and develop greater cultural competence. This obstacle is endemic and reflects a growing lack of trust of government that is trans-cultural and directed at all levels of government. This is especially true for immigrant communities in the midst of coping with the stresses of a post-9/11 regulatory and legal climate. The work and orientation of the project partners attempts to bridge this gap. The development of trust and the provision of services are central to the ability of the project partners to work effectively. Gaining access to these populations at risk for research purposes is fostered through the development of these relationships. Such access can gain some interesting insights. In some of the first round of Teen Educator administered occupational health surveys it became evident that at least among respondents to date that new arrivals tended to originate in Haiti vs. Central Americans. It is particularly valuable for such findings to validate truths that are known to the community. Sometimes research protocols can be overly focused on understanding causality of a particular phenomenon. The project partners urge the identification of broader research methods which offer an array of qualitative and quantitative tools.

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Recently, we hosted a day long symposium at the national Society of Environmental Toxicology and Chemistry (SETAC) meeting in Milwaukee, WI in November, 2007, entitled: “Environmental Health: from Lab Bench to Community and Class Room.” One of the invited speakers, an internationally known chemistry educator, initiated a conference call with Center members this week to discuss how we (the group of presenters) could sustain the momentum of the symposium. He sees that high quality communication is desperately needed and it is largely missing. We agree. Communication initiatives need to match research initiatives in terms of quality and creativity in all areas. For that to happen, such activities need dedicated funding sources.

Novel Opportunities NIEHS Center COECs need to be given the charge and the resources (funding opportunities for inter-center programs) to build a unified national program to support collaborative communication programs of the highest quality and content that bring to bear the full weight of Center research across the country. Such programs would include learning how to communicate effectively and offering venues in which to transfer this knowledge. We envision that effective communication will need to involve a variety of non-scientists with communication expertise. Most importantly, the wisdom gained from actually working with communities as communication partners will be key to developing confidence in new communication initiatives.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups  
Development of educational and outreach materials is laudable however as I have mentioned above the critical needs are for support for community partnerships for exchange not just

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another brochure and in the funding of integrative projects that require integrative models in order to understand, facilitate and implement the research findings. Brochures would again be secondary to these efforts.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups  
From a risk communication perspective, both healthcare professionals and pregnant women seeking advice from them represent audiences for which educational and outreach materials regarding fish consumption risks and benefits are lacking or in need of improvement. Healthcare professionals, including nutritionists, are generally not educated in giving advice about fish consumption, and pregnant women, and other women of childbearing age, seeking advice from these professionals may not be receiving outreach materials to help them make healthy, informed decisions about eating fish. NIEHS efforts to be in engaged in this important opportunity area must, however, take into consideration that disagreement and uncertainty exist regarding the balance of fish consumption risks versus benefits. Center investigators and others are making strides in addressing these roadblocks, however, funds that can be used to leverage interactions with other funded projects for communities are essential in this new field. For example, joining public health nutritionists to spread our messages about fish consumption are very logical and productive partnerships. In addition, Pediatricians (via the Northwest Pediatric Environmental Health Specialty Unit) and birth midwives are groups that could be partnered with with modest additional funds. Such interactions could include joint presentations at local and national professional conferences and development of fact sheets for most frequently asked OHH questions.

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- o The best opportunities for engagement are:
  - (2.A) Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, and
  - (2.B) Research: such as - Biomedical research—specifically population-based, intervention, prevention, and translational research, and research on effective health literacy strategies.
- o The primary roadblock is inadequate funding.

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Over the past decade, the main push seems to have been to the lay public, students and teachers, with less emphasis on ensuring consistent mechanisms for translating scientific results to healthcare professionals and policy-makers. These latter 2 audiences are key to reach to ensure they are part of the dialogue and making decisions that are based on both science and the recognized needs of the public. The Institute of Medicine has acknowledged repeatedly that environmental and occupational health are NOT incorporated into medical curricula, and that this is a critical barrier to overcome in training allied health professionals. However, these are the people we rely on to both identify and treat environmental disease -- and it is rare that

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patients are even asked for occupational or environmental exposure histories. We rely on policy makers to protect public health from environmental contaminants, and yet again, there is no systematic resource for informing their decisions. The major roadblock in each of these constituencies is minimal time and the need for readily accessible and reliable information with accepted scientific validity in concise formats.

Another key need, recognized by NIEHS and yet continuing to need attention, is increased understanding of community issues by scientific researchers. This includes not only what the issues are, but also what is known from community knowledge of exposures, and respect for community knowledge. Although much progress has occurred in this realm, there remains substantial arrogance and/or ignorance on the part of many researchers supporting the feeling that community knowledge has little value. Although the emphasis from NIEHS has been successful in making the larger research community acknowledge community needs, concerns, and knowledge, the fundamental distrust of the community perspective is still pervasive and limits the validity assigned to community information. In other words, OK to listen, but chuckle at the misattribution of cause and effect later.

Finally, the community-research partnerships have also gone a long way to improve the community awareness of scientific credibility, and how to interpret information to separate sound science from opinion and confounders. However, there remains substantial distrust of science and research that will take more time and successes to overcome. Part of this process is going to require success in changing policy and health care to demonstrate that the science serves the community need.

Barriers: fundamental lack of time for professionals, lack of fiscal resources and time for communities, lack of uncommitted funds to respond in a timely manner by researchers, no current point of conversion for reliable, concise information.

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#### New and Best Opportunities for NIEHS to be Engaged

- Engage the target audience in the process of developing educational and outreach materials so that the materials are age and culturally appropriate, integrated into other programs and “user friendly” for the intended audience.
- Support academic, multidisciplinary degree programs and outreach initiatives based at universities that would provide the structure to reach all of the target audiences within a region to address environmental public health concerns within their communities. As an employment and training program, the NIEHS MWT/BMWT initiative can serve as a model for comprehensive approaches to solve economic disparity issues through opportunities in emerging industries, under the guidance and participation of multiple stakeholders.
- Facilitate building multi-lateral partnerships at the federal, state, and local governmental level, especially departments of Labor, Education (Office of Vocational and Adult Education), HHS and other agencies providing social and economic support services, and environmental agencies, such as the EPA and local equivalents. This would facilitate greater buy-in at the governmental level, provide multiple avenues for providing core funding, allow for a freer flow of best practices, and connect grantees and students to needed services and avenues for employment.
- Support programs for K-12 students and their teachers so that issues relating to environmental concerns are understood at an early age and shared with their families. Teachers need training programs as well access to materials that they can integrate into existing curricula.



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Roadblocks to Implementation of Activities

- Reluctance of employers to provide the training for employees is a major roadblock to implementation. When there is no federal legislation that requires appropriate training for workers and residents about how to respond to hazardous situations, employers frequently do not provide the training. Lack of funding for workers to receive on-the-clock training in the form of wage replacement or teacher substitutes is also a barrier for participation.
- Lack of critical support for universities to build capacity to provide the faculty breadth and depth required to mount the academic degree programs.
- Lack of fellowships to train the next generation of scientists and educators.
- Low priority of local agencies to provide support for public health or environmental issues.
- Lack of understanding regarding the link of environmental issues to individual and community health.

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Establish grant on-going grant funds for community-based organizations to teach health care professionals and researcher how to communicate with and interact more effectively with local residents. Too often community people are treated like lab rats or guinea pigs without respect and full consideration for solutions to environmental hazards that create public health risks and negative health outcomes. Too often major health education or enrichment workshops and seminars are filled with Ph.D.s and other health professionals and no community-based representatives as experts on environmental health issues.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups  
It isn't a question of educational and outreach materials. Vast amounts of information on environmental exposure and human health and environmental science already exist, beautifully written, much even translated into appropriate community language or where students are concerned, grade appropriate—and much of it produced in the past years by NIEHS, EPA, et al. The problem, the roadblock if you will, is that while NIEHS has so much information, pamphlets, curricula and so forth, it has no simple, effective infrastructure—no extant pipeline—to bring this information—knowledge is a better word—to the community.

Here is one simple suggestion:

That the NIEHS create a strong partnership of good will and mutual trust with the inner-city middle schools in many of the larger cities of the nation. (i.e. where Centers already exist). Obviously, these schools are the most beleaguered, the teachers most overworked, the “pushing through” of environmental curricula is seen, quite often, as a burden during a busy school year.

The funding of academically intensive summer schools—schools not simply programs—even on a small scale addresses the following problems:

- 1.) it gives students who have nothing to do in the summer an intellectually challenging atmosphere. The suggestion is that under an environmental theme—reading, writing, math and environmental science—can introduce students, hopefully through field trips and relevant

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reading and writing, to the natural context from which biologically relevant questions spring. i.e. many of the students who are handed biology texts in the ninth grade have no real world context, an intellectual frame, into which they might begin a deeper study of science. Simply put: it is difficult to ask oneself or others questions about nature (basic biology) if you haven't ever seen a tree, or a river, or a bay, or a forest...

To wit: the complicated, state of the art, enquiry that is now world science began somewhere—and as ontogeny recapitulates phylogeny, so the intellectual life of a student—who might or might not become a scientist—must begin with the same contextual understanding that other generations and people who have not grown up within the inner cities assume, take for granted, etc.

2.) Teachers—while beleaguered in the winter, in summer, teachers welcome a chance for new experimental—again out of the box—teaching where what is at stake is their ability to teach, the students ability to learn, and the natural world and a little curricula as texts.

3.) Community—With a strong, ongoing rapport with only one middle school in a city, parents and other community members are brought in. It becomes a dependable venue. Schools exist (hopefully) for decades. Too many of our community projects have a short fuse, the projects are too short to have long term impact.

We need to think about having a community venue—the suggestion here is a school—that gives the participating centers a LONG TERM relationship to the community. NIEHS has been an institute for 48 years now; many of the inner city schools have a similar track record. We need to create institutional partnerships that have long term stability, that don't leave neighborhoods "when the grant is over", that keep going... we need a method by which the community can began to see us as long term, staying partners.

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups  
Enhance comprehension and penetration of materials so that city and county policy makers understand and use accurate, evidence-based information.

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Development of educational and outreach materials for the following audiences, lay public, students and teachers, healthcare, professionals, researchers, policy makers, other groups

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

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RFI Responses: Question 2A – Where are the new and/or best opportunities for NIEHS to be engaged in the following areas? What are the roadblocks? (2.A) Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups

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Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups  
Provide technical information in Spanish to students an teachers and healthcare professionals where appropriate, grants to researchers for epidemiologic and characterization studies and empowering communities to participate and influence policy making and specially regulatory decision making.

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Development of Educational and Outreach Materials for the following audiences: lay public, students and teachers healthcare professionals, researchers, policy makers, other groups?  
• Create venues to bring together diverse audiences to share their needs and wish lists of educational and outreach materials.  
• Before materials are products, there needs to be piloting events conducted to test the usefulness of the materials.  
• Some of the road blocks in partnering with community is lack of funds to provide stipends for community members.  
• Grassroots organization are usually working for free, because there are not enough grants to support the maintenance of their organization.

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o I think you need information to come from credible sources, MDs, RDs (registered dietitians), pharmacists, exercise physiologists, and government. etc. There needs to be some level of quality control so that information at the “research bench” level (e.g. cells and animals) does not go directly to the public. Although it is very expensive, we need human studies in order to provide appropriate information to the public.

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In general there are very few outreach and educational materials (particularly those that have been evaluated in the target audience) for environmental health for all of the audiences mentioned above. NIEHS should incorporate the development of such materials (with the incorporation of appropriate personnel) into NIEHS research grants (both investigator initiated and Center programs), as well as programs targeted at professionals in the development, implementation and evaluation of environmental health outreach and education materials. A major roadblock is the lack of qualified professionals who have experience in this area. NIEHS could create fellowship programs (pre-doctoral, post doc and K Awards) to encourage training of professionals in this area.

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Global change and Oceans and Human Health are areas with increasing public interest but a dearth of usable outreach and educational materials for any of the target populations mentioned above. This represents an opportunity for NIEHS.

Cooperation with other Agencies (such as NSF, CDC, EPA, NOAA) with an interest in outreach and education as well as environmental health could leverage existing scarce resources.

Furthermore, incorporation of some of their existing programs (e.g. NSF COSEE Programs) could also leverage scarce resources as well as bring new outreach and education mechanisms to NIEHS.

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The development of outreach and educational materials are simply a matter of resources and time. TRES has compiled reliable and objective documentation as well as its own research findings over the past five years. Information that is currently available from the past to the present is utilized to evaluate an accurate account of aquatic conditions that effect all living organisms. This information is gathered from a vast and credible amount of sources.

We intend to create materials that can be used and understood by all age groups, educational levels, professionals, researchers, non-profit environmental groups, policy makers, etc. Written information as well as public presentations can be arranged to meet these objectives.

The best opportunities for the NIEHS to be engaged in these operations is not limited.

At this time we have access to many avenues to implement these objectives, and are well prepared to begin this process.

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1) Development of relevant interactive educational materials.

2) Creation of universal information hotline for immediate access to environmental exposures, causes, and effects using succinct laymen's terms.

3) Utilization of printed materials with pictorial depictions which is particularly important for people with lower literacy levels.

4) Engage local community cable television services to broadcast educational series using hands-on-images identifying hazards and ways of reducing environmental exposures, and may incorporate call-in access via live feed programming and simulcasts.

Roadblock - scientific community not producing and sharing relevant information and using community-based or grass-root organizations to become partners in the dissemination of understandable informations.

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The best opportunities for NIEHS to be engaged in protecting the public health is the training and development of an informed leadership at the community level who will be able to effectively communicate information to strategic stakeholders and policy makers to make the necessary changes. The core group of community leaders who are training in particular skills, including but not limited to data gathering, basic toxic effects of the particular contaminants, the particular agencies and departments who are responsible for regulation of the type of contamination, the ability to access the persons responsible for enforcement of environmental or public health regulations, how to disseminate public information through the various media

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sources, the ability to demonstrate public speaking and writing skills, how to develop effective negotiation skills and developng networking and partnership building skills. There are not sufficiently trained core communiture leaders who are able to maintain a consistent plan of action to address the multiple prongs of activity necessary to address the environmental health concerns of these affected communities. The basic research of identifying the pollutants and their point sources are only the beginning of the formula necessary to effectively address the exposure on public health, particularly in communities most affected.

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We would suggest education of the child care community (teachers, parents, families, child care associations, community colleges where preschool teachers are trained). Roadblocks include time to create materials to be used and getting the child care community interested in this topic when they have so many competing interests, activities, and concerns.

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- Students and teachers: NIEHS should partner with NCEH and other partners (NACCHO, NEHA, the Association of Environmental Health Academic Programs [AEHAP]) to develop marketing materials to recruit and train the future environmental public health workforce.
- Lay Public: Outreach materials should be developed in partnership with NCEH/EEHS to effectively engage communities in public deliberation and community collaborative activities focused on local environmental health. Specific efforts should focus on communicating what environmental public health does for community residents to ensure safer and healthier communities.

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- ATSDR’s Division of Health Assessment and Consultation works closely with communities to identify and evaluate their concerns about potential exposure to environmental contaminants released at a facility. Socioeconomic factors and educational levels vary significantly between, as well as within, communities. Many communities would benefit from a basic understanding of the concepts of environmental public health, potential exposure to environmental contaminants, and public health concerns associated with exposure to certain contaminants. Specific examples include: 1) increased potential for adverse health effects from asbestos exposure to community members who also smoke; and 2) potential health effects associated with air pollution and actions individuals can take to reduce their exposure and protect their health.

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