



1020 Legacy Drive  
Bedford, VA 24523  
Phone: (540) 297 5982  
Fax: (540) 297 1860  
www.legacyintl.org

## **FINAL PROGRAM REPORT:**

Grant Agreement: S-ECAPE-09-GR-169(JJ)

Organization: Legacy International

Project: Legislative Fellows Program

Report Date: APRIL 30, 2012

Submitted by: Mary Helmig, Legacy Project Director

Report Period: SEPTEMBER 15, 2009 - March 2012

## **I. Introduction**

Legacy International conducted the Legislative Fellows Program (LFP) in the Gulf region from September 2009 until April 2012. Countries of focus included Bahrain, Oman and Kuwait. Including GCC countries in LFP was extremely positive and fulfilled the primary goal of the US Department of State - creating mutual understanding between the people of the U.S. and other countries. No one could have predicted the Arab Spring would commence in the midst of this LFP cycle. Having an exchange with GCC members built rapport and educated all participants about the structure, evolution and potential of representative government in the participating countries.

In March 2010, a decision was made by US post officials in Manama, Bahrain and Tom Johnston at ECA, Washington DC to authorize Legacy International to drop Bahrain from the list of countries in this exchange. We concentrated all implementation efforts on Oman and Kuwait. This decision was extremely important and timely as we all witnessed Bahrain's experiences with the Arab Spring Movement in 2011. Post officials wrote:

*"PAS Manama has been monitoring this exchange program since it was approved last fall and has been in communication with Legacy International on the feasibility of its implementation. The political climate in Bahrain is extremely sensitive. Individuals in Bahrain have targeted the British Ambassador and, more recently, one of the MEPI-funded projects in Bahrain claiming "foreign interference" in Bahraini domestic affairs. There is no doubt there is a correlation between these accusations and the upcoming elections in the country, but nevertheless, there is the potential that*

*Legacy International (and by extension ECA and the Embassy) could receive substantial criticism for the activities it is promoting. Unfortunately, post does not believe that this exchange is likely to succeed without significant effort or additional modification of the program. Thus, post recommends that the Bahrain portion of this program be reallocated to Kuwait or Oman. "*

Legacy's partnership with the U.S. Association of Former Members of Congress (USFMC) made this a very strong program. USFMC members acted as mentors to Fellows and opened doors for meetings and placements. The sessions led by former members on the nature of our legislative system were informative. The inclusion of former members in the outbound delegations enabled the discussions in country to be substantive, drew important players together, and reached wider audiences.

## **II. Selection of Gulf Fellows and In-Country Partnerships**

Legacy partnered with Amideast in Oman and Kuwait to conduct the recruitment and selection of candidates. We had 83 applicants for 20 fellowships. It was important for Legacy staff to travel to the two countries during the launch program and meet with high-ranking governmental and non-governmental organizations to target specific candidates. Amideast was in constant communication with PAS officials during the selection and visa procurement phase and all went smoothly. Legacy identified 2 alumni in each country to organize the US delegations visit to each country. This was highly successful and yielded high-level meetings and substantive exchange.

*Age range of Fellows:* Legacy, upon approval from ECA, raised the upper limit age from 35 to 40. Amideast staff and Post officials recommended this change, as many people in this age group hold influential positions that would help them relay the information attained from this fellowship to their communities upon their return. Also, during our recruitment process, there was a high interest from people who were above 40, but we had to inform them that they couldn't apply due to the age restriction.

### III. Measuring Program Impact - Multiplier Effect

Authors Bhandari and Belyavina of the Institute of International Education (IIE) wrote in their June 2011 report entitled *Evaluating and Measuring the Impact of Citizen Diplomacy: Current Status and Future Directions* - "Comprehensive assessments of such programs continues to pose a challenge, as the associated outcomes and impacts are often intangible, not immediate, and qualitative rather than quantitative. Outputs such as the number of participants and their degree of satisfaction with programs are usually measured. Yet citizen diplomacy is often most impactful in its multiplier effects on institutions, communities, and societies. These effects are easily underestimated due to their longitudinal nature and the difficulty in measuring them. By definition, long-term impact takes many years to manifest, often long after program funding has ended and the implementing agency has lost touch with alumni. " "As the role of soft diplomacy in an increasingly interconnected world becomes more significant, keeping record of qualitative and anecdotal information of program outcomes will continue to have great value because it provides perspective on how programs affect lives. This evidence captures the data and the stories of how individuals transform their societies on micro and macro levels, and reinforces what most experts believe intuitively to be true: international learning opportunities, in whichever form and at whatever stage in life, have transformational effects on individuals and communities."

At the close of this round of LFP, Legacy chose to work with Mission Measurement, a strategy-consulting firm that helps clients create value through social change. Mission Measurement's approach to measurement is both rigorous and practical. The process helped us measure not just processes and outputs, but tangible outcomes and the value of those outcomes. Mission Measurement staff reviewed the pre- and post- program survey results (designed and conducted by ECA.) Together we created a plan to measure the results 1-2 years post-fellowship. The full impact framework and indicators are below. Our assessments are based on qualitative data i.e. self- reports and participant perceptions of a program's impact. Interviews of Gulf delegates were conducted by third parties by phone. The findings of this assessment are based primarily on the quantitative results of the survey, and supplemented by qualitative information obtained in open-ended questions.

| Outcome   | Indicators   |
|---|--|
| <p><b>Improve participants' ability to obtain influential positions</b></p>                     | <p><b>As a result of participating in the LFP:</b></p> <ul style="list-style-type: none"> <li>-25% of participants with more job responsibility in same organization</li> <li>-17% of participants with a higher level job in same organization</li> <li>-25% of participants with a higher level job in different organization</li> <li>-58% of participants with more opportunity to influence public policy</li> <li>-83% of participants that list LFP as a professional credential</li> </ul>   |
| <p><b>Inspire participants to implement a concept/idea/model learned during the program</b></p> | <ul style="list-style-type: none"> <li>-75% of participants that publicly shared something they learned from the LFP</li> <li>-83% of participants that shared something they learned from the LFP that their peers/colleagues found useful</li> </ul> <p><b>Based on concept/idea/model they learned during the LFP:</b></p> <ul style="list-style-type: none"> <li>-75% of participants that changed professional behavior</li> <li>-42% of participants that changed a practice or policy within their organization</li> <li>-25% of participants that created a new initiative or organization within their community</li> </ul> |
| <p><b>Increase participants' advocacy for the value of civil society</b></p>                    | <p><b>Participant activities since completion of the LFP:</b></p> <ul style="list-style-type: none"> <li>-75% of participants that encourage their peers to get involved in civil society</li> <li>-58% of participants that encourage collaboration or consultation with (other) civic organizations</li> </ul>   |
| <p><b>Increase Participants' value of public debate</b></p>                                     | <p><b>Compared to what participants did before LFP:</b></p> <ul style="list-style-type: none"> <li>- 83% participate in more public forums to discuss societal issues (panels, blogs...)</li> <li>-50% have taken more initiative to bring together people to discuss societal issues (online forums, conferences...)</li> </ul>   |

| Outcome   | Indicators  |
|---|---|
| <p><b>Increase participants' collaboration on ways to address societal issues</b></p> | <ul style="list-style-type: none"> <li>-83% of participants that remain in contact with other participants</li> <li>-83% of participants that remain in contact with US contacts</li> <li>-25% of participants that engage in a social or political collaboration as a result of LFP contacts</li> <li>-25% of participants that engage in professional collaboration as a result of LFP contacts</li> </ul>  |
| <p><b>Increase participants' commitment to civic engagement and participation</b></p> | <ul style="list-style-type: none"> <li>-58% of participants that state that they are more civically engaged compared to before participating in the LFP</li> <li>-67% of participants that are more civically engaged than their peers</li> <li>-17% of participants that have joined a civic or community organization</li> <li>-50% of participants that are active members of a civic organization</li> <li>-50% of participants that have increased responsibility in civic organizations</li> <li>-83% of participants that stay informed of current events: in their country; in their region; in the United States; in other areas</li> <li>-75% of participants that perceive current issues differently due to LFP experience</li> </ul> |
| <p><b>OTHER<br/>(Program questions)</b></p>   | <ul style="list-style-type: none"> <li>-58% of participants that rank this program as one of the three most valuable experiences in their professional life</li> <li>-67% of participants that rank this program as one of the three most valuable experiences in their personal life</li> </ul>  |

## Open-ended questions reveals levels of impact on Gulf Fellows

Three of our Omani delegates work at the Ministry of Legal Affairs. Upon returning home, each delegate gave a presentation at the Ministry on what they had learned and observed while in the U.S. One of these fellows, **Ali Al Saeedi**, realized that there is not an adequate understanding of the separation of the executive, legislative and judicial branches in Oman. When he returned home he began the process of developing a greater level of educational awareness in the ministries and the Shura Council about the legislative process. Another fellow, **Riyadh Al Balushi** has implemented a better inter-office communication system in the Ministry, which has led to more integrated procedures for drafting laws, and more structured and efficient weekly meetings. **Sarah Al-Sharji** was given more responsibility in the Ministry, and published several articles on legal issues. She has since moved to a different Ministry and hold an influential position.

As a Chief of Staff for a Kuwaiti MP, **Abdullah Al-Awadhi** was able to implement some significant reforms in his MP's office, including:

- Weekly mail meeting – Staff review phone calls received from constituents and discuss handling of responses. This allows the MP to better address concerns in specific *diwanniya* that she visits on a weekly basis.
- Intern Program – Abdullah started the first intern programs in the Kuwait Parliament, interviewing and selecting candidates from several universities in Kuwait.
- Twitter – One can now follow his MP on Twitter. Several other MP's have also begun "tweeting."

Also in Kuwait, **Sara al-Asousi**, a statistical analyst at the Ministry of Justice, had two newspapers publish her two statistical studies. **Najat Al-Amiri**, a legal scholar at the Public Institution for Social Security, was inspired by the internship model in Congressional offices and constructed a legal internship at the PISC and has increased her volunteerism in Bayt Abdullah Children's Hospice.

**Huda Al- Masharaf** employee of the Ministry of Health and **Basmah Al-Kiyumi** a lawyer and activist from Oman jointly started two projects:

- Encouraging Reading Among Schoolchildren in partnership with the Ministry of Education, Writer's Forum, and the Omani's Women's Association, beginning in the Muscat region.
- Young Healthy Cooks – In partnership with the Ministry of Health and educators of nutrition for children 6-10 years old. The pilot program is run in 1-2 private schools and offers classes once a week on healthy eating and cooking. This program debuted shortly after our delegation arrived in Oman.

## Examples that DOS Exchanges are a great investment.

1. H.E. Majid Al Alawi, President of Administrative Adjudicative Court Oman and the Undersecretary of Department of Justice HE Sheikh Zahir al Abri were participants in an IV program to US for Judges in 1990s. They spoke highly of their experiences. Our Second US Delegation to Oman visited them in April 2011.
2. LFP Alum Dr. Mashaal Al Hijri - Associate professor of comparative law at Kuwait University was recently announced winner of the Ruler of the United Arab Emirates Sheikh Khalifa Bin Zayed Award for the Distinguished University Professor in the Field of Teaching - Arab World Level (Khalifa Award for Education, Abu Dhabi, 2011.)
3. LFP Alum and former Fulbright Scholar Khalid Al Haribi Foudner of a think tank in Oman called Tawasul was recognized by Secretary Hillary Clinton in Gulf news. He also ran for the Majlis Ashura (lower chamber) in October 2011.
4. LFP Alum Basmah Al Kiyumi - is a political activist in Oman speaking and blogging and organizing sit-ins at the Majlis. She is advocating for a complete overhaul of the constitution of Oman. She stands at one side of the spectrum and is prompting constructive dialogue over sensitive issues.

## IV. Program Impact - The People

### 18 Gulf Fellows (11 Omanis and 7 Kuwaitis)

#### Congressional Hosts included:

| Congressional Placement                 | Fellows   | Committee affiliation   |
|---|---|---|
| 1. Erik Paulsen (R-MN)                  | Spring - (Talal Ali - Kuwait)   | Financial Services  |
| 2. Bobby Rush (D-IL)                    | Spring (Saoud Al Shoaili - Oman)<br>Fall (Mariam Al Shemali - Kuwait)                               | Energy and Commerce, Technology and Internet, Education and Labor   |
| 3. Mark Souder (R-IN)                   | Spring (Riyadh Al Balushi - Oman)   | Education and Labor, Homeland Security, Oversight and Government Reform   |
| 4. William Delahunt (D-MA)              | Fall (Basmah Al-Kiyumi - Oman)  | Foreign Affairs (Chairman of Subcommittee of Europe), Judiciary   |
| 5. Homeland Security Committee          | Fall (Najat Al Amiri - Kuwait)  | Homeland security   |
| 6. Debbie Wasserman-Schultz (D-FL)      | Fall (Huda Al Masherri- Oman)   | Appropriations - Chief Deputy Whip in House Democratic Caucus   |
| 7. Senator Joeseeph I. Lieberman (D-CT) | Fall - (Abdullah Al Awadhi - Kuwait)  | Chair, Senate Homeland Security and Governmental Affairs Committee, Armed Services, Small Business and Entrepreneurship |
| 8. John Conyers (D-MI)                  | Spring (Sarah Al Sharji-Oman)   | Chairman House Judiciary Committee  |
| 9. Jared Polis (D-CO)                   | Fall (Dana Al Sarhani-Oman)   | Education and Labor and Rules   |
| 10. Andre Carson (D-IN)                 | Spring (Mona Ameen -Kuwait)<br>Fall (Abdullah Al Mahruqi- Oman)                                     | Financial Services  |
| 11. Michael McMahon (D-NY)              | Spring (Abdulmanan Al Balushi - Oman)<br>Fall (Khalid Al Haribi - Oman and Sarah Al Asousi- Kuwait) | Foreign Affairs, Transportation and Infrastructure  |
| 12. Alcee Hastings (D-FL)               | Fall (Ali Al Saidi - Oman)  | Intelligence and Rules  |
| 13. Sheila Jackson Lee (D-TX)           | Fall (Mashael Al Haribi - Kuwait)   | Foreign Affairs, Judiciary, Homeland Security   |
| 14. Gregory Meeks (D-NY)                | Fall (Ahmed Almasharafi- Oman)  | Foreign Affairs and Financial Services  |

**U.S. Association Former Members of Congress mentors included:**

1. Hon. Butler Derrick (D-SC)
2. Hon. Beverly Byron (D-MD)
3. Hon. Phil English (R-PA)
4. Hon. Larry LaRocco (D-ID)
5. Hon. Jim Slattery (D-KS)
6. Hon. Scott Klug (R-WI)
7. Hon. Jack Buechner (R-MS)
8. Hon. David Minge (D-MN)
9. Hon. Martin Lancaster (D-NC)
10. Hon. Martin Frost (D-TX)
11. Hon. Ron Sarasin (R-CT)
12. Hon. Tom Downey (D-NY)
13. Hon. Barbara Kennelly (D-CT)

**Other hosting organizations:**

1. Congressional Muslim Staffers Association
2. The association of the Chiefs of Staff
3. U.S. Department of Labor,
4. National Science Foundation
5. Department of Commerce
6. Congressional Research Service
7. The Hawthorne Group
8. Politico
9. American Public Health Association
10. Legal Aid Society
11. Pew Project on Excellence in Journalism

**10 US Host Families in Southwest Virginia** enjoyed a long weekend with Fellows during the Spring and fall programs.

*“We felt very blessed to have had the opportunity to host Sarah. We learned so much about a part of the world that we are not very familiar with. Hopefully, one day we will visit Oman.”*

Debbie & Ted Melnik of Roanoke, VA

## V. Congressional fellowship Experiences

**A. Content of Fellowship:**

Fellows were assigned a variety of projects and tasks. All fellows appreciated the opportunity to work on substantive issues, in particular those related to their area of expertise. The fellows:

- Covered hearings, providing written reports and notes to their offices—some of which were read by the member of Congress.
- Attended meetings with constituents and interest groups.
- Researched issues for upcoming legislative initiatives.
- Wrote memos, reports, and talking points for speeches
- Drafted and reviewed bills and floor statements
- Handled constituent issues, including a request for support with a child custody case in which the fellow communicated directly with the constituent
- Held discussions with staffers and members
- Shadowed the member of Congress and other staff
- Answered phones, opened mail, etc.

***B. The Member's Experience:***

Members of Congress were happy to host Muslims from the Middle East. They were happy to help dispel any misperceptions that they or others may have had about the acceptance of Muslims in mainstream America. This hospitality came on the heels of the widely publicized, Park 51 “Ground Zero” mosque controversy. The fellows were also here during the Koran-burning controversy, making it obvious to everyone they came in contact with—including many in the U.S. Congress during a charged election season—that moderation and Islam typically go hand in hand.

***C. The Caliber of the Gulf Fellows:***

Running the Legislative Fellows Program at the Federal level offered many opportunities for the Gulf Fellows (highly regarded professionals.) to work at a professional level with peers. The high caliber Gulf fellows allowed them to debunk many of the myths about their societies, impress their U.S. peers with the progressive work they are doing, and allowed for substantive dialogue on models of policy making.

***D. Obtaining Congressional placements:*** Legacy strived to have a balanced ratio of Republican and Democratic placements. In spring 2010, this was achieved. The fall 2010 placements were a bit more of a challenge as many offices were hosting semester-long interns and finding desk space is an acute challenge. Also, this fall included a busy re-election season. For those facing tough elections or managing a busy legislative agenda, accepting a placement and managing a fellow would have presented an added demand on their time and resources. Also, some Congressional members were retiring and felt they could not offer substantive experiences. The eligible pool given all those

characteristics posed some challenges. In the end, those offices that did agree to host a fellow were very welcoming. In 2011-2013 LFP proposal (which was awarded) we changed the fall election fellowship experience to include some time on Capitol Hill and some time working in district.

## VI. Outbound Delegations

There was a total of eleven US delegates to the Gulf (Four in Trip #1, and Seven in Trip #2) A group size of four delegates per country allowed for substantive exchange at each location and each delegate was able to contribute in a meaningful way. The smaller group size also allowed the program to be designed to directly address the interest areas of each American delegate. This, in turn, helped to form sustainable relationships with Gulf counterparts.

The length of the trip was roughly 5 days in each country plus travel days. Former members also expressed that 7-9 days is the most time they would be able to spend away from work and home. Due to House of Representatives and Senate ethics requirements, delegates from House and Senate offices were only able to participate for 7 working days and 2 travel days. We thus took two different delegations to each country, which allowed everyone to be fresh and alert. However, this model did exclude comparative analysis between countries and did not allow delegates to see the uniqueness of each Gulf country.

### Trip #1 - December 2010

Legacy took these four delegates to Oman and Kuwait. We were 5 days in each country

1. **Hon. Scott Klug**-- Republican, Wisconsin's 2<sup>nd</sup> District. Years in Office: 1991-1999.
2. **Hon. Larry LaRocco**-- Democrat, Idaho's 1<sup>st</sup> District. Years in Office: 1991-1995.
3. **J. Saleh Williams**-- Legislative Assistant to Representative Gregory Meeks (D-NY), member of Congressional Muslim Staffers Association, now currently working for Islamic Relief as a governmental affairs liaison
4. **Lauren Holland**-- Executive Assistant of Congressman Andre Carson (D-IN)

## Trip # 2 - March-April 2011

### In Kuwait

1. **Hon. Martin Lancaster** (D- NC 1987-1995)
2. **Chris Griffin** - Military Affairs Legislative Assistant, Office of Senator Joseph I. Lieberman (Connecticut – Independent)
3. **Stanley Watkins** - Chief of Staff to Congressman Bobby Rush, (Illinois 1<sup>st</sup> District – Democrat)
4. **Jason Scott** - The Corporation for National and Community Service, Office of Leadership Development and Training

The five of the most important experiences for me (Hon Martin Lancaster included:

- a. The dewanniya - lively discussions and democracy at work.
- b. The visit with the Speaker of the Assembly and MP Dr. Aseel Al Awadhi.
- c. To see the transformation in the landscape/cityscape since Desert Storm.
- d. The visit to Camp Arifjan to visit with our Army personnel who are doing such great work in the withdrawal from Iraq.

### In Oman

1. **Hon. Jack Buechner** (R- MS 1987-1991) - also Former President of the *International Republican Institute*
2. **Hon. Judge David Minge (D-MN 1993-2001)** currently serves as a Judge on the Minnesota Court of Appeals.
3. **Vance Serchuk** - Foreign Policy Advisor, Office of Senator Joseph I. Lieberman, Connecticut – Independent
4. **Jason Scott** - The Corporation for National and Community Service, Office of Leadership Development and Training
5. **Carol Pillsbury Patton** - Legislative Counsel to Congressman Conyers was also selected for the trip but withdrew due to responsibilities with Congressman Conyers.

### **Examples of impact on US delegation**

US delegates gained a better understanding of Kuwaiti and Omani political processes, social development goals, and cultural influences and a greater awareness of regional stakeholders. On several occasions, US delegates represented the sincere desire of Americans to learn more about the strong cultural and societal elements that support the government and people of Kuwait and Oman. The second cohort visited immediately following advent of the Arab Spring. Kuwaitis had the opportunity to show how their 50 year old parliament and free press was a beacon for the region. Omanis showed the progressive nature and attitude of the Sultan and the desire to embrace the youth participation in the process. The peaceful nature of the people of Oman and the genuine respect for the Sultan's progressive vision and strategic thinking is allowing the people of Oman to experience this giant political and social growth spurt with confidence that all will work out well, and it is time to give people more say in government. There was a lot of restructuring of the Ministry leadership prior to our arrival; and hence the transition to new management means most feel a little unsure about there agreed-upon priorities. One of the main changes that the Sultan announced was that there would be more legislative powers given to the Shura counsels (Majlis) in the hope that this will create a more representative government. There will be committees formed to develop a plan for implementing this

reforms and supporting the elections in October. This has generated a lot of enthusiasm and many qualified leaders who previously felt it was not worth their while to work within the shura structure will now run. Khalid Al Haribi (LFP alum) is an example. He expressed the hope that we may see in the next few years a real shift away from tribal leaders maintaining power and toward more merit-based leadership in Oman. At the same time, there is frustration that change is not happening fast enough. There is a lot of discussion and a sort of "free for all" with all issues being debated in on-line forums. Since the Legacy trip in December, we noticed that the media is actually reporting at a different level now with freer discussion of details.

*Below are some examples of how delegates increased their understanding:*

1. Both trips to Kuwait corresponded to vibrant societal debate. Trip #1 was made during a constitutional crisis (allegations of corruption between MP's and the PM) they were able to witness firsthand the Kuwaiti procedures for dealing with this kind of challenge to the constitution and the strengths and weaknesses of the Kuwaiti system. Trip # 2 - the National Assembly was gearing up to hold interpellation hearings charging 6-8 cabinet members and ministers with various misconduct charges. The Prime Minister was one of these people. The day after we left, the Emir fired most of his cabinet and several ministers, which essentially halted to the National Assembly process. Critics say this is how Kuwait works and most of those people will be back in their jobs again soon. US delegates had deep discussions with members of the Law Faculty of Kuwait University some of whom wrote the constitution and with the Speaker of the Parliament.
2. In Oman, members of the delegation noted the strong role of the Sultan in development of all policy and the positives and negatives resulting from a "top down" style of policymaking.
3. The need for civil society development and the training of public administration professionals was noted in both countries. In Kuwait, it seemed to be more a case of lack of interest in public service—something our fellows are working to change; while in Oman there was more interest, but governmental hesitancy to support the non-governmental sector was prevalent.
4. U.S. delegates gained insight into the meaning and history behind the differences between Sunni and Shia Islam and the political roles these affiliations play in the region; including increased insight into inter-GCC politics, and the role of Iran in the region.

5. Positive media coverage of US delegation's visit:

<http://main.omandaily.om/node/38817> (Translated using Google Translate):

[http://translate.google.com/translate?js=n&prev=\\_t&hl=en&ie=UTF-](http://translate.google.com/translate?js=n&prev=_t&hl=en&ie=UTF-)

<8&layout=2&eof=1&sl=ar&tl=en&u=http://main.omandaily.om/node/38817>

<http://www.alraimedia.com/Alrai/Article.aspx?id=242826&date=04122010>

<http://alwatan.kuwait.tt/ArticleDetails.aspx?Id=73817>

<http://annaharkw.com/annahar/Article.aspx?id=243079>

<http://www.alanba.com.kw/AbsoluteNMNEW/templates/local2010.aspx?articleid=155>

## **Meeting Highlights: Kuwait**

### ***Trip #1***

- **Dar Al-Athar Al-Islamiyyah at mahboula** – Private tour of the world's third largest collection of Islamic art, collected by Sheikh Nasser Sabah al-Ahmed al-Sabah (son of the Emir of Kuwait), This tour was arranged by his daughter, Ms. Bibi Al-Sabah, granddaughter of the Emir, who also graciously hosted a dinner at The Chairman's Club for us on the last night in Kuwait.
- **Al Watan paper** – One of the largest Arabic and English language papers in Kuwait; met with Editor-in-Chief and political reporters to learn more about the role of media in Kuwait.
- **Women's Cultural & Social Society** – A group of 15 leading women from the Women's Cultural and Social Society (the organization primarily responsible for getting women the right to vote in Kuwait in 2006) discussed women's rights in Kuwait and the GCC. The event was covered by five press outlets and attended by about 25 members of the society.
- **Kuwait University School of Law** – Meeting with Dean of Faculty of Law and several leading professors, including the foremost authority on constitutional issues in Kuwait. Included discussion of the current constitutional crisis over the balance of power between the National Assembly, the Prime Minister, and the Cabinet.
- Lunch at the **weekly gathering of Abdullah Al-Awadhi's family** – Attendees included Abdullah's father and uncle, both former Ambassadors to countries such as Switzerland, Yemen, Iraq, and Sudan. His aunt, the first woman in the Middle East to be the dean of faculty of law (Kuwait University in the 80's), and MP Dr. Aseel Al Awadhi, one of the first four women to be members of Parliament.

- Gulf alumni organized a **Bedouin style “cook-out”** in the desert one evening, which offered a different perspective on the landscape and culture of Kuwait and also gave the delegation the chance to see the miles of oil fields outside of Kuwait City.
- **Gulf University of Science and Technology (GUST) Panel Discussion**—LFP alumnus Abdullah Al-Awadhi and the former members of Congress (Hon. Scott Klug and Hon. Larry LaRocco) encouraged people to consider careers in public service and spoke about respective legislative systems. There were approximately 90 people in attendance.
- **Coffee with US Ambassador Deborah Jones**, DCM, and political and public affairs staff at the Ambassador's home. We discussed future projects involving public administration development in Kuwait.
- **International Islamic Charitable organization** – Meeting with the executive director and chairman of the board of the Muslim world's largest charitable organization; discussion on how banking regulations since 9/11 have negatively impacted their operations.
- **Special Event at the Chairman’s Club** – (The 96 members of this club are CEO’s and members of the royal family.) Ms. Bibi Al-Sabah, the Emir’s granddaughter, hosted this dinner; attendees included 15 civil society leaders and politicians.

*Total number of people we directly interacted with= 230. News coverage reached hundreds more.*

### **Trip #2**

- **Round table discussion on Kuwait and politics today at the Political Science Department and American Studies Unit, Faculty of Social Sciences (Kuwait University).** This was a lively discussion on Kuwait’s position as a model of participatory government in the region, the concerns over Bahrain, and perceived inconsistencies of US foreign policy. Panelists included, Dr. Abdul-Reda Assiri Dean College of Social Sciences, Dr. Abdullah Al-Shayji, CHairman of Department of Political Science, Dr. Faisal Mukyat Abu Sulaib, Department head of American Studies Unit, and Dr. Haila Almukaimi, Associate Professor Political Science.
- **Kuwait Bar Association**, Khalid Al-Kandari President, Wasmi Al Wasmi, Vice President, Nasser Al-Kraween Manager and Member Board of Directors hosted a discussion on the association's advisory role in the policy-making process.
- Meetings, arranged by Abdullah Al Awadhi (LFP fellow and Chief of staff for Member of Parliament), with **Dr. Aseel Al Awadhi**, one of the first four women members of the Kuwaiti Parliament, and with **Speaker of the National Assembly His Excellency Jassem Al-Kharafi**.
- Evening: **Dewaniya** ( the traditional Kuwaiti political and social gathering)with Abdullah Al-Awadi.

- **Kuwait Chamber of Commerce** -- meeting with Mr. Rabah Al Rabah Director General and Mohammed Karam Senior Researcher. Group discussion on the need for growth of private sector and economic diversification.
- Meeting with Abdoul Latif Al Houti - **Managing Director International Marketing Kuwait Petroleum Corporation** offered a holistic discussion of oil production and economy in Kuwait
- **US Embassy** meeting with **Ambassador Jones**, Public Affairs section, and Defense attaché.
- **Kuwait Women's Association** (one of the most influential civil society organizations in Kuwait) this was a discussion with more than 20 people on women's rights in Kuwait. It was covered by two media outlets.
- Due to the delegates interest and history with defense and armed services, the Embassy arranged a meeting for them at **Camp Arifjan, U.S. Army base** in Kuwait.

*Total number of people we directly interacted with= 110. News coverage reached hundreds more.*

### **Meeting Highlights : Oman**

#### ***Trip #1***

- **Ministry of Legal Affairs** – Discussion on the role of this ministry in drafting and approving law.
- **Injaz** – (Gulf version of junior achievement) the delegation learned about efforts to develop the entrepreneurial spirit within the large youth population of Oman.
- **Environment Society of Oman (ESO)** – (The most influential civil society organization in Oman and only non-profit dedicated to environmental issues). We met with Dr. Mehdi Jaafar, a founding member of ESO and internationally know champion of the environment.
- **Tawasul** – Discussion with Khalid Al Haribi (LFP alumnus) who is the founder and managing director of this civil society development organization, the first national and independent think tank in Oman. Its mission is "to empower civil society institutions through training and knowledge."
- **Discussion on demographics and the health care system** in Oman – with LFP alumnus Ahmed Almasharafi, Director of Complementary Medicine in the Diwan of the Royal Court.
- **Reception at Ambassador Schmierer's house** – LFP sponsored this event, which included 80+ people from various ministries, international NGOs such as Amideast and World Learning and civil society organizations and MEPI alumni.
- **Industry Innovation Center** – A meeting with Dr. Abdullah Al Zakwani about the process of industry innovation and development in Oman.
- **Majlis al Dawla** (Upper House) – Meeting with Vice-Chairman, His Excellency Dr. Abdullah al

Shanfari and Dr. Fawzia Nasser Al Farsi.

- **Home Hospitality** – With the family of LFP alumna Dana Al Sarhan.
- **Civil Society Leaders Award** ceremony attended by 200 people; the “who's who” of Oman Civil society work. Hosted by Tawasul.

*Total number of people we directly interacted with= 200.*

## **Trip #2**

- **Tawasul** - Briefing on history of Oman and civil society development
- Meeting at the **Sultan Qaboos University** with Dean and Associate Dean of College of Law; included discussing the training of lawyers and young professionals who will go into government positions.
- Meeting with **Director General (Ibrahim Al Hosni ) of Ministry of Legal Affairs** and three LFP alumni and other young professionals there.
- Meeting with the **Undersecretary of Justice** HE Sheikh Zahir al Abri and the **Attorney General** Hussain Bin Ali Al Hilali - discussing the structure of judicial system in Oman.
- **Majlis Al Dawla (Upper Legislative chamber)** - Hon. Dr Sayyid Said Al Busaidi - Vice Chairman of the State Council - Discussion on that body's responsibilities
- Meeting with **US Ambassador Schmeirer** and Public Affairs Staff Dan Pattarini at the US Embassy, and excellent discussion included impressions and insights into the Sultan's leadership style.
- **H.E. Majid Al Alawi, President of Administrative Adjudicative Court** - briefing on the court systems and structures.
- **Muscat American Business Council** - roundtable discussion with several business people and the economics attaché from US Embassy about the current political climate and labor unions, the current spate of work stoppages and the need for training of union leaders and Omanis as managers.
- Meeting at **Oman Women's Association** Muscat with Hon. Shukur Al Ghammari who share information on the role of this organization in Oman's civil society.
- **Research Council** - HE Dr. Ali Al Hinai Secretary General shared research and development strategies in Oman for science and technology, strategic plans and budget.
- Meeting with **Secretary General of the Majlis Ashura (Lower legislative chamber)** - Abdulqadir bin Salim al Dhahab led a discussion on reforms.
- Meeting with **Dr. Mehdi Ahmed Jaffar** -Vice President Environmental Society of Oman.

- Meeting with **Former US Ambassador Richard Baltimore** at the Saslo Legal Training Center - discussion on the training of lawyers and judges as well as his insights on current climate in Oman.
- Meeting with the **Sidab Women's sewing group** - a micro enterprise training program for women - handicrafts, computer training, photography school.
- Legislative Fellows **Reception at US Ambassador Residence** – Over 75 people in attendance including MEPI alumni, LFP alumni, Embassy personnel, and private sector representatives.

*Total number of people we directly interacted with= 210. News coverage reached hundreds more.*

## WH&T IF Program

### Collaboration between the United States and China to Address Global Water Issues – A Final ‘Blue’ Paper

In 2010, 22 individuals involved in various aspects of water resource management in the United States and China embarked on a project to study and learn about water issues in each country – and from each other. They would collaborate virtually and in person, and all had the chance to learn about the broad challenges facing water management from professionals, professors, government officials and young people in grass roots non-profits in both countries. These “*Water Here and There International Fellows*” combined their diverse experience to ask WHAT IF?

Choosing a topic for the exchange of young professionals between two of the largest and most influential nations in the world was straightforward. Environmental and climate issues are, by definition, global, and therefore require cross-border cooperation. China’s Gobi Desert “is claiming a million acres of land every year, and soon 40 per cent of China could be lost to the creeping sands brought in by worsening sandstorms. Millions of tons of sand from the Gobi desert are dumped on Beijing by sandstorms every spring, and Chinese dust makes its way into the skies above cities as far away as Los Angeles.”<sup>1</sup> And both China and the U.S. are large nations with large populations, and which are blessed with a relatively abundant supply of water. But, both nations face critical challenges balancing economic needs with the ability of their rivers and wetlands to filter waste generated by human and industrial practices. Thousands of square miles are paved over in each country to make way for homes for bulging populations or buildings and factories that provide needed jobs in tough economic times. And, this does not even begin to factor in the damage caused by fertilizer and annual waste runoff caused by agricultural production in both countries. Yes, both nations have a responsibility to continue to bolster agricultural production to help feed themselves (in the case of China) and the world (in the case of the U.S.). But, they also have a responsibility to harness the highly educated and innovative human capital each country possesses, and to do so in a manner that is truly “world class.” Without consideration of best practices in water management, neither society can claim it is a true global environmental steward.

### The Participants

| Chinese Delegation   | American Delegation   |
|--|---|
| Zhou Ying, Project Officer<br>Society of Entrepreneurs and Ecology<br>Alxa, Inner Mongolia | William Christiansen, Program Planner<br>Alliance for Water Efficiency<br>Chicago, IL |

---

<sup>1</sup> Clifford Coonan, “*The Gathering Storm: Encroaching Desert, Missing Water*,” The Independent, November 9, 2007.

|  |   |
|--|---|
| Zhang Yanjun, Engineer<br>Chongqing Environmental Protection Bureau,<br>Chongqing City                       | Alex Manda, Assistant Professor in Water<br>Resources<br>East Carolina University<br>Greenville, NC |
| Lu Xiaoxiao, Graduate Student<br>Beijing Forestry University, Beijing  | Queenie Tsui, Consultant<br>Queenie Tsui Engineering Solutions<br>Phoenix, AZ                       |
| Lu Jie, Student<br>Chongqing Nanfang Translators College of<br>Sichuan International Studies University      | Ricky Caperton, Student<br>Sonoma State University<br>Sonoma, CA                                    |
| Sun Ji, Program Coordinator<br>Sichuan Greenriver Environment Protection<br>Association, Chengdu City        | Christopher Kukk, Associate Professor<br>Western Connecticut State University<br>Danbury, CT        |
| Wu Donghai, Engineer<br>Government of Chongqing, Chongqing   | Eric Hartman, Executive Director<br>Amizade Global Service-Learning<br>Pittsburgh, PA               |
| Gao Fei, Engineer<br>Beijing Municipal Administration Center of Parks,<br>Beijing                            | Michael McCarthy, Graduate Student<br>University of South Florida<br>Tampa, FL                      |
| Yang Xuezhong, Head of Pollution Control Section<br>Environmental Protection Bureau, Alxa, Inner<br>Mongolia | Lee Cain, Education Director<br>Anacostia Watershed Society,<br>Bladensburg, MD                     |
| Hu Ying, Engineer<br>Ningbo Water Supply Company NWSC, Ningbo  | Karen Gref, Independent Environmental Specialist<br>All Appropriate Inquiries<br>Inkster, MI        |
| Wei Zhang, Assistant Researcher<br>East China University of Science and Technology,<br>Shanghai              | Shaun Horne, Stream Maintenance Biologist<br>Sonoma County Water Agency<br>Santa Rosa, CA           |
|  | Mason Throneburg, Water Research Engineer<br>CH2M HILL<br>Chicago, IL                               |

|  |   |
|--|---|
|  |   |
|  | <p>Liz Voeller, Foreign Expert<br/> Wuhan University of Science and Engineering<br/> Wuhan, China</p> |

## Program Format

The two groups met virtually to work together on addressing some of the key broad challenges facing water managers.

- Consideration of access to clean safe drinking water in urban and rural areas
- Ways to balance economic activity with the health of the environment
- Engagement of the public in the discussion/debate of environmental issues, and in the participation of water conservation activities in urban and rural areas
- Development of long-term policies which have realistic chances to make significant gains in fighting environmental degradation

This was followed by the exchange, with the Chinese delegates traveling to the United States in March/April, and the American participants traveling to China in June. Each group participated in a four-week series of lectures, site visits, seminars and meetings with representatives of public, private and non-profit sectors. The group continues to collaborate on various partnerships.

## Background: Challenges and Opportunities for Collaboration

“Bubble up” versus “Cascade down”

In the history of the development of the industrial economy, consideration for the environment was rarely, if ever, a priority. Dams were built to produce electricity and waterways served as cost-efficient means to move resources and products from the interior to ports and from ports across oceans for trade. The response to the resulting loss of clean, potable water for populations moving to bigger cities was to draw water from sources further and further away. The frontiers of both the United States and China have long since closed.

Beyond this historical bond, the similarities begin to blur, or end altogether.

In the U.S., the response to environmental degradation in general has tended to be initiated on a local level. Polluted lakes and rivers, the disappearance of native species of fish due to algae blooms caused by fertilizer leaching into bays, and rapid erosion caused by overdevelopment on sand dunes and on banks of waterways has tended to elicit action by the individuals and communities most affected by the degradation.

The program was built on the premise of five stages of policy development in complex problems involving multiple, competing constituencies emerging professionals need to understand as they rise into decision-making positions in their communities:

*Stage One:* The public recognizes diminishing access to clean water for drinking, recreation, and use in agricultural and industrial production, organizes into a variety of groups, and communicates the need to address the problem to the government.

*Stage Two:* The government gathers data, gets input from the full range of constituencies affected by the loss of access to clean water, drafts legislation, debates, refines and enacts laws to address the problem.

*Stage Three:* A variety of public and private institutions are engaged to implement the legislation. This includes research to determine the current state of affairs and how this state was reached, establishment of intermediate milestones in reaching the ultimate goal, description of the resources and technology available to address the problem and suggestions of ways to attract and apply these resources.

*Stage Four:* Local and regional public, public-private coalitions and private sector entities review this research and develop action plans to apply the recommendations to local water resource situations.

*Stage Five:* Public and private non-profit and for-profit entities implement these recommendations in the form of such things as building improved wastewater treatment facilities; re-establishing wetlands to filter storm runoff; reducing harmful agricultural runoff by introducing new fertilizers; working with land-use planners and developers to build more efficient properties; and, engaging local citizens in clean-up activities.

This is both a circular and interdependent process. Once efforts at improving water quality are implemented, various entities measure and report on the success of the efforts, public offices and research organizations study ways to improve regulations, and the public is informed of progress and engaged in debates on costs and benefits of larger and more costly measures needed to improve water quality and access to clean water.

In short, the response “bubbles up.”

This was an appealing approach to the Chinese participants. The Chinese government has tremendous power to affect the location of manufacturing, and often exercised this power with little regard to the environment or existing demands on the local water supplies. Farmers in these communities have little recourse against the government or businesses. So, for the Chinese participants, a grass-roots approach by average citizens to address their needs is alluring.

The strong central government in China affects Chinese response to water quality and water shortage issues. China’s response to rapidly deteriorating conditions in some parts of the country was slow, and the alarmist and passionate voices of a few individuals were generally ignored.

Or, more accurately stated, the central government's quest to provide rapid economic development that would produce jobs for its huge population, as well as a desire to increase agricultural production to feed these people – at all costs – left environmental concerns a distant second priority. However, this has changed in the 21<sup>st</sup> century, as Beijing realizes it needs to use its absolute influence to solve what become serious water challenges (from rapid desertification in Inner Mongolia to the lack of clean drinking water in major cities in China's East Coast). This has resulted in a command style response to set ambitious goals and to channel financial resources to address these goals. This results in a “cascading down” approach in which the central government mandates change and tries to force results.

This had a certain appeal to the American participants. The central government identifies a problem, quickly establishes tough new guidelines that businesses and individuals must immediately follow and destructive practices are quickly reversed. There are no delays caused by legal actions that drag on in the court system, and needs of the environment are addressed with little to no regard to how this affects individuals.

Based on this, there is a differing sense of personal responsibility in each nation. While the tendency for Americans is to take matters into one's own hands, the predilection of the Chinese is to wait for the government to take action.

So, what is the best way to cooperate? Should the American approach be to engage Chinese public officials to educate them on the long term effects of water shortages and poor water quality and their effects on quality of life? Or, should Americans engage the local Chinese citizens directly affected by increasingly dire challenges regarding access to clean water and try to educate them on effective ways of collaborating with the government to achieve results?

And, how should the Chinese approach collaborating with the Americans? The U.S. has the technology to address water management and aging infrastructure, but it does not take action until an emergency arises. For example, in 1993, more than 100 Milwaukee residents died as a result of a cryptosporidium contamination of the water supply, a known bacteria which was not considered for treatment because it was previously thought to pose little danger of infiltrating the city's water system. And communities across state lines squabble over water rights, preferring to use the courtroom over trying to achieve common ground that would result in more efficient water use for all residents. How do the Chinese work with Americans to help them to encourage a tentative federal government to take bold steps to protect valuable liquid assets? Again, in an interconnected global climate, these two nations and societies need to learn how to work together to achieve universal success.

Along these lines, there is a challenge of language. Few Americans who dedicate themselves to addressing water issues also speak Chinese, and only a small percentage of Chinese working on the low priority of addressing environmental concerns are also fluent in English. Also, as noted, the two societies are at different points in their socioeconomic and political evolution. For example, one of the public sector Chinese participants had never heard the term “non-profit” or “NGO,” and couldn't understand how these types of organizations could exist in China.

In 2010, the Americans possess the technology and advanced water management techniques, but lack the financial resources and political will to address issues such as increasing water shortages and aging infrastructure. The Chinese face arguably more severe water challenges than those found in the United States as the nation has not addressed environmental considerations in its drive toward economic modernization and self sufficiency. But, China has a strong central authority which has now set ambitious targets in addressing environmental degradation, and is in a strong financial position to apply assets to the clean up. However, it lacks a supply of qualified human resources with the experience to apply best practices in comprehensive water management.

## **Outcomes**

Given this, there is common ground that can be forged between the two nations. The participants in this program are studying and working toward goals:

- Collaboration of partnerships with people and institutions in both nations to develop joint efforts that lead to increased sharing of knowledge across the Pacific Ocean
- Development of exchanges that provide training and exposure to best practices found in each nation; ways to engage the public to understand the severity of the problems facing the two nations (indeed, the world), and to educate them in ways to take action
- To inspire a next generation of young talented minds to consider applying their energy and passion to assuring a continued supply of a basic commodity that sustains all life.

## **The Group's thoughts on consideration of access to clean safe drinking water in urban and rural areas**

### ***Framing the Issue: Drinking Water Supply in Rural and Urban areas in the U.S. and China***

#### **1. United States**

The critical challenge of supplying sufficient quantities of healthy drinking water varies considerably across the geographic and demographic diversity of the United States. Naturally, the challenges faced by cities in the arid west are distinctly different from those encountered in areas of greater rainfall, and distinctions in these general cases further arise due to differences in quality of the source water and competing demands for the water. One framework for better understanding the challenges of drinking water supply in the USA is considering how the need for potable drinking water is met in rural vs. urban areas. The majority of urban areas, and thus the majority of the US population, is served by centralized water treatment works supplied by surface water sources. However, the majority of drinking water systems are actually groundwater systems serving smaller communities and rural areas. In addition, roughly 15% of Americans depend on private wells for their drinking water supply. Despite these differences, two critical requirements for both urban and rural systems are ensuring adequate water supply (quantity) that meets minimum standards for human consumption (quality).

## *Quality*

Drinking water quality standards are defined by the US Environmental Protection Agency (EPA) to ensure public health. Agencies serving 25 or more individuals are under the jurisdiction of the Safe Drinking Water Act, originally passed in 1974 and revised in 1986 and 1996. Several interrelated initiatives are designed to provide multiple barriers against water pollution.

### Source water protection

Preserving the environmental integrity of the watersheds that provide drinking water supply is a key component of the US approach to drinking water supply. Several major cities (New York, San Francisco, Boston) receive a significant portion of their drinking water supply from high quality source areas, permitting these agencies to reduce treatment costs by not requiring filtration. For groundwater sources, the EPA regulation of injection wells, and also regulation of other contaminants of concern help to preserve the quality of source water. Water-quality effluent standards are defined for wastewater treatment plants also, both helping preserve the integrity of aquatic ecosystems and increase the quality of source water for downstream utilities.

### Standards

Drinking water standards are defined for contaminants of concern based upon a combination of scientific understanding of the contaminant's impact on human health. Cost-benefit analyses are included as part of the definition of standards. Treatment-based contaminant removal

### Testing

Mandatory testing by utilities and publication of results is a key public awareness component of the approach to ensuring quality of drinking water supply.

## *Quantity*

### Supply

Providing the necessary year-round supply of drinking water is a challenge in the face of growing populations, competing industrial and agricultural demands, and increased climatic uncertainty associated with global warming. Both urban and rural areas face unique and complex challenges to drinking water systems, from both surface and groundwater sources. These challenges can be approached from two primary directions: Supply: Increased supply of water supply generally involves technological engineering solutions to store a greater percentage of the rainfall, and/or convey water to locations

where consumers exist. Increasingly, desalination is considered a viable, if costly, alternative for providing increased drinking water supply to coastal areas.

## Demand

Reduced demand for drinking water can be achieved in several ways. Water conservation is an often cost-effective education-based approach to change consumer behavior to utilize less water (e.g. reduce or eliminate lawn watering, more efficient fixtures, and promotion of water-harvesting or re-use technologies).

## Environmental Impacts

There is an increasing focus in providing safe, affordable drinking water in the most sustainable, environmentally conscientious manner. Preserving ecologically sustaining base flows that support keystone aquatic species is an environmental goal that must be balanced with drinking water extraction. The Federal Endangered Species Act (ESA) of 1973 protects threatened and endangered plants and animals and requires drinking water municipalities to limit their impact on the habitat of such species. Furthermore, reducing the carbon footprint of treatment procedures is an increasingly monitored, though still voluntary, metric for drinking water utilities.

## United States – Framework Summary

A combination of technological, educational, and environmental approaches to providing high-quality drinking water supply are utilized in both urban and rural areas. These approaches, and the differences that arise in urban and rural areas, will be considered further in the case studies that follow.

## 2. China

As we know, China is rich in water resources, several great rivers such as Yangtze River, Yellow river are home to some of the most ancient civilization in the world. However, many Chinese are facing more and more serious issues about water, one of these issues is how to get enough safe drinking water now and in the future. Critical challenges to drinking water supply include surface water pollution, groundwater overdraft, climate change, rapid urbanization, limited natural resources and population density. With the economy growing fast, industry and factories have flourished rapidly increasing water consumption. The government of China has taken a number of steps to protect the environment and fresh water supplies; currently the Ministry of Environmental Protections is responsible for protecting China's air, water, and land from pollution and contamination. In 2003, a revision of the 1972 Drinking Water Management Statute by the Environmental Protection Administration was formulated to improve public drinking water quality. China's water law's relating to drinking water includes the Prevention and Control of Water pollution (1984), Collection of Pollution Discharge Fee (1982), National Environmental Monitoring (1982). The government has agreed to a number of important Environmental Conventions such as the Ramsar Convention that promotes the wise use and protection of wetlands and the

Biodiversity Convention in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro.

## Rural

It is estimated that in rural areas 320 million people do not have access to clean drinking water. Rural areas mainly rely on underground water or springs. Many wells or springs contain harmful minerals, which can cause cancer or other diseases.

## Urban

Rural to urban migration is creating rapid urbanization increasing water demands in metropolitan areas, requiring cities to draw on fossil aquifers (a non-renewable water source) and on rural water sources. Water quality is poor in many urban areas due to lack of wastewater treatment facilities in upstream regions and from industrial and agricultural pollution. Since the 1990s, more than 400 cities of 660 cities in China have not been able to supply enough water, more than 20 million people suffer from a lack of water resources.

## *Quality*

State Environmental Protection Administration (SEPA) defines ambient water quality standards. Five categories are designed to rate fresh water quality; grades 1, 2 and 3 permit direct human contact and can be used as raw water for potable water systems. Grade 4 is restricted to industrial and recreational use and grade 5 is restricted to irrigation.

## Surface Water Pollution

Industrial effluents are drastically declining water quality contaminating drinking water. Urban surface water is the most polluted due to large inputs of untreated industrial and municipal wastewater.

## Agriculture pollution

Rapid urbanization requires more farmland, which draws more water and currently requires more fertilizers and chemical pesticides both of which cause water pollution. Some irrigation areas require a flooding technique, which is inefficient and pollutes water resources.

## Pollution and disposal

In March 2005, the water conservancy bureau admit that more than 70% water in china has been polluted, underground water in 118 cities more than 64% has been seriously polluted, 33% relatively slightly polluted. In December 2005, the Xinhua press said, the underground water in more than 90% of cities in China suffer pollution from organic or inorganic contaminants. In 2004, China's cities produced about 35.6 billion m<sup>3</sup> of

sewage, only 45.7% of which was disposed of, 297 cities of 661 cities still have no sewage disposal system.

## Testing

According to Article 11 of the Drinking Water Management Statute “The quality of drinking water shall meet drinking water quality standards”(2003). New national compulsory standards on drinking water will soon require that 107 water quality indices be monitored, which is an improvement from out dated standards that required only 35 indices. The new standards are at about the level of other moderately developed nations. New standards will test for organic pollutants and harmful chemicals associated with industrial pollution.

## *Quantity*

### Supply

Though it seems that the amount of water resource in China is rich, which is about 2800 billion m<sup>3</sup> (only less than that of Brazil, Russia and Canada), China is actually poor in water resource as we have the biggest population in world (more than 1.3 billion), so theoretically, each person only has 2300 m<sup>3</sup> water, which is only 1/4 comparing with global averages. China needs upwards of 549.7 billion m<sup>3</sup> (2002) water every year, which is among the most consumptive societies in the world. ([http://news.xinhuanet.com/fortune/2005-09/19/content\\_3512629.htm](http://news.xinhuanet.com/fortune/2005-09/19/content_3512629.htm))

### Regional Supply

China's water supply can be broken up into nine water resource regions based on the boundaries of major river systems, challenges to water supply vary considerably across these geographical regions. Southern China contains 55 percent of the population and 81 percent of China's fresh water resources. Northern China supports 41 percent of the population with 14 percent of China's water resources.

### Ground Water

In Beijing, Hebei, Tianjin, and Shandong the water table is dropping 3 meters annually due to overdraft from industry and agriculture. Throughout China groundwater sources are being overexploited.

### Climate change

Due to climate changes glaciers are retreating, monsoon seasons are shifting, and ground water recharge rates are slowing. For example in Qinghai-Tibet plateau is known as the water tower of Asia is experience retreating glaciers, permafrost areas are melting causing plant degeneration, which directly reduces water resource in the region. The most famous example is Qumalai County the source of the Yangtze river basin, the township of this county has moved twice due to lack of drinkable water, as the wells dried from

108 to only 1. (<http://www.chinadialogue.cn/>), and more than 40% of the area of Qumahe xiang is undergoing desertification. ([http://www.lotour.com/snapshot/2007-4-18/snapshot\\_62419.shtml](http://www.lotour.com/snapshot/2007-4-18/snapshot_62419.shtml))

## Case Studies

### *Drinking Water Supply in the Chicago Metropolitan Area*

The six-county region hugging the southwest corner of Lake Michigan is home to roughly 10 million people, including 3 million in the City of Chicago, a host of industries, and still even remnants of agriculture. Although on the banks of one of the largest freshwater systems in the world, Chicago and the surrounding area face a complex set of challenges in the present that highlight the evolving environmental values of citizens in the area and beyond.

#### Historical Interlude

Chicago grew rapidly in the mid 1800s, an urban hub integrating the agricultural activities across the Middle West. Drinking water was initially a minor concern, as the great Lake Michigan supplied immense quantities of pristine freshwater to the growing population. However, human and animal waste from the growing City flowed into the Chicago River which discharged into Lake Michigan, polluting the source water. In 1900, engineers from the Metropolitan Sanitation District embarked upon an ambitious engineering process to dig through the small sub-continental divide that split the Great Lakes drainage basin from the Mississippi basin via the Chicago Sanitary and Shipping Canal. Upon completion, waste produced in Chicago was discharged out of the basin downstream towards St Louis and other downstream communities.

#### Urban Supply

- a. Water Supply: In the urbanized portions of the Chicago Metropolitan Area
- b. The construction of the Chicago Sanitary and Shipping canal was an engineered, technical solution to a public health risk posed by the growing population. However, as the City has grown, additional controls have been necessary the water supply.

#### Source Water Protection:

A large number of industries, including steel and petroleum refining, are located along the periphery of the Great Lakes. Effluent discharge permits regulated by the Environmental Protection Agency (EPA) have played a large part in protecting the source water of this fresh water resource

#### Water Treatment:

The City of Chicago has a very large filtration and disinfection plant that provides potable water to Chicago and surrounding communities. Due to the high quality of the source water, additional treatment processes are not necessary.

#### Water Quantity:

Extractions from the Great Lakes basin are regulated by intergovernmental agreements that limit withdrawals from the Great Lakes basin. Most communities relying on Great Lakes water are subject to such rules. However, Chicago is not, as its current withdrawals, which support both potable water consumption and flushing of the Chicago Sanitary Shipping Canals are grandfathered. However, environmental concerns suggest that in the future, pressures and legal challenges may be mounted to challenge these extractions.

Some efforts towards increased water conservation are pursued. Recognizing the interconnection of drinking water supply and storm water management, the city's rain barrel and cistern program attempts to harvest rainwater for later reuse, reducing potable water consumption. However, while most commercial users are metered, roughly 80 % of residential users are unmetered, reducing financial incentive for water conservation.

#### Environmental Impact:

Recognizing that the water used by Chicago is used as source water for downstream communities (e.g. St. Louis and other cities along the Illinois and Mississippi river), wastewater treatment to levels regulated by the EPA is performed. Interestingly, during intense rainfall events, the canal cannot convey runoff from the area fast enough, and flows from the river may discharge back into Lake Michigan, the source water location. The regional agency for water reclamation has developed a network of large storage tunnels and reservoirs to attempt to capture combined sewer overflows, however even this vast storage is insufficient during large events.

The engineered interconnectedness of Lake Michigan with downstream ecosystems has caused recent concern that Asian carp (*Hypophthalmichthys niloticus*), endemic in the Illinois River system, may soon populate Lake Michigan, with possibly catastrophic impacts for the lake ecosystem and dependent commercial activities. While technological barriers are currently forestalling this outcome, legal challenges from the state of Michigan advocate closure of the Chicago locks, effectively separating Lake Michigan from downstream ecosystems, and in some ways reverting to an early 20th century hydraulic regime (minus the hundreds of square miles of impervious coverage). In the future, environmental concerns may result in increasing consideration of returning drinking water to its source- that is, discharging treated effluent back into Lake Michigan, the City's source water.

#### Water supply in rural collar counties:

Many of the Chicago suburbs are within 30 to 45 miles of Lake Michigan. However, they are unable to convey this water to their users. Despite their proximity to such an abundant supply of freshwater, many of these users are dependent on groundwater resources for potable water supply. The Chicago Metropolitan Planning Agency has recently completed a study of water issues in this area, and notes that growing population may result in water scarcity within the planning horizon.

Summary: Drinking water supply in the Greater Chicago area

Chicago is located on Lake Michigan, part of the Great lakes, an amazing freshwater resource. While being adjacent to this lake means that supply is not an issue for Chicago itself, many smaller communities in the Greater Chicago area are dependent on groundwater, and face pressures as suburban development continues. More than anything, the story of drinking water supply in Chicago emphasizes how linked water supply issues are to wastewater treatment; source water control, ecosystem considerations, and how engineering solutions have solved some issues while others persist.

### *Sonoma County Case Study*

Sonoma County is located in Northern California and covers 1,600 square miles. The climate is mild with wet winters and warm summers temperatures range from 90 F (32 C) to 32 F (0 C), average rainfall for the areas is 30.45 in (773 mm). Drinking water in Sonoma County is regulated under the Federal Clean Water Act of 1974, Clean Drinking Water Act and the California Clean Drinking Water Act. The Federal Endangered Species Act (ESA) of 1973 and the California Endangered Species Act (CESA) protects plants and animals that are in endangered from becoming extinct. The California Water Department of Water Resources is responsible for protecting, restoring and enhancing the human and natural environments. The State and Regional water Quality Control Boards regulate surface water quality, monitor contaminants and establish guidelines for discharge permits. The Sonoma County Water Agency (SCWA) supplies water to residence in Sonoma County and Northern Marin County. SCWA's water rights permits require that stream flows be augmented during dry months to provide fish passage for endangered salmon (*Oncorhynchus* sp.) and for recreation and tourism, which are major industries for communities throughout the Russian River.

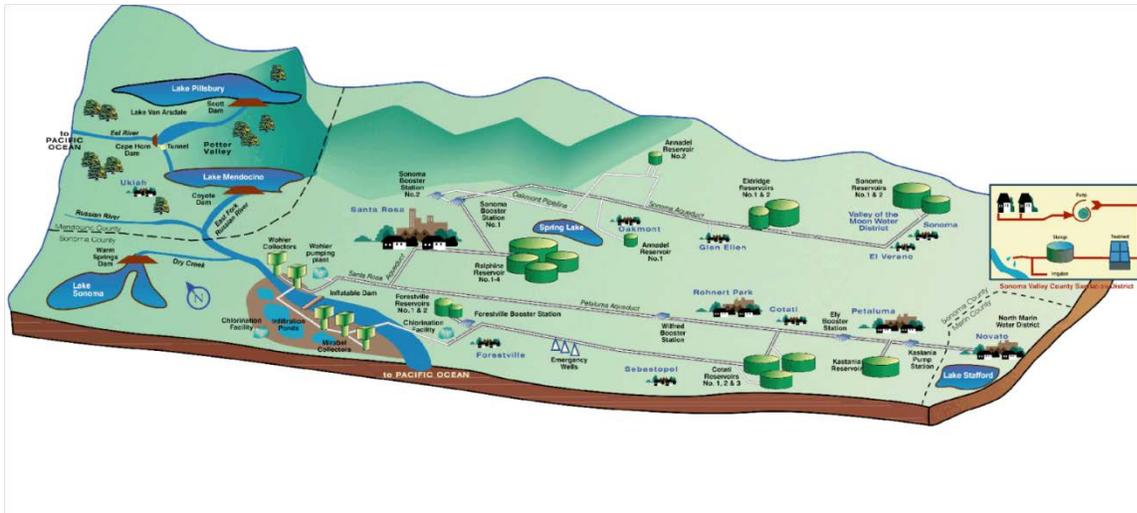


Figure 2. Water management facilities of Sonoma County Water Agency.

Map source (SCWA, [www.scwa.gov.ca](http://www.scwa.gov.ca).)

### Urban Supply:

In Sonoma County water supply is managed by the Sonoma County Water agency, this municipality serves 600,000 people throughout Sonoma and Northern Marin County.

### Source Waters:

Water comes from the Eel and Russian Rivers, both north of Sonoma county, source water is very clean and requires little treatment before it is transported to cities for distribution. The high quality of source water is partially due to the fact that there are no large cities utilizing the Russian rivers water resources upstream. It is also due to the quality of the environment upstream.

### Storage:

Three primary reservoirs with a total storage capacity of 386,366 acre-feet of water feed the Russian River Watershed. Water is pumped from the Russian river facility to individual cities which all have additional storage capacity insuring adequate amounts of water during drought periods.

### Monitoring and Testing:

The Department of Water Resources and the Sonoma County Water Agency regularly monitor the water quality of source waters throughout the Russian River Watershed. The Army Corps of Engineers monitors water quality behind the reservoirs. Drinking water is regularly tested and must meet California drinking water standards as well as Federal drinking water standards.

### Waste Water Treatment:

Centralized treatment facilities are connected and operated at the city level and though out the county strict standards ensure that water is treated sufficiently.

Obstacles to Water Supply in Sonoma County include:

- Meeting water supply demands with an aging infrastructure
- Allowing for adequate in-stream flows during dry season
- The population of Sonoma is projected to grow from 480,000 to 600,000 residents over the next 20 years
- Climate change uncertainties
- Invasive aquatic species and endangered species
- Overconsumption of water resources
- Development

Best Management Practices that have taken shape to overcome these obstacles include:

Carbon free water is a concept that SCWA is working to achieve by 2015. To meet the goal of carbon free water the county now produces 2 mega watts (MW) of solar electricity through photovoltaic systems, is investing in chicken waste biodigestion systems, utilizes hybrid and biodiesel vehicles, operates Warm Springs Hydroelectric Dam which produces 2.6 MW of electricity and is researching the feasibility of hydrokinetic energy projects off the coast of Sonoma County.

Water conservation:

Santa Rosa is one of the many cities throughout the county that has implemented many different types of conservation methods in the form of incentives such as rebates, direct install plumbing for toilets, and offering money for irrigation system upgrades and removing turf as means to cut back on water demand. In launching the water conservation programs Santa Rosa has successfully saved between 15 and 17 million gallons of water, which essentially conserves that water for other uses such as allowing more water in the Russian River for ecosystems. Overall, on a consistent basis Santa Rosa has cut its demand for water by about 15% on average annually. Not only does this provide this water for other needs, it lowers each individual households water bill by educating them on how to conserve water on a day-to-day basis.

Ecosystem Enhancement:

The Sonoma County Water Agencies has implemented Stream Maintenance Program to increase the overall biodiversity of the area while promoting habitat development in engineered flood control channels. Within the Russian River Watershed the Coho salmon (*Oncorhynchus kisutch*), Chinook salmon (*Oncorhynchus tshawytscha*), and Steelhead trout (*Oncorhynchus mykiss*) are species listed under both ESA and CESA. During the dry season low flows in the Russian River constrain salmon migration. Because of this the SCWA is working to enhance habitat while

balancing supply needs with ecosystem services. Warm Springs Dam allows for water to be released from Lake Sonoma ensuring that adequate amounts of water stay in stream. The Porter valley project diverts water out of the Eel River north of Sonoma to ensure summer flows meet the needs of aquatic biota and for recreational as well as tourist industries.

Creek Stewardship Programs that engage community members in habitat restoration and creek cleanups are organized by SCWA and the City of Santa Rosa. The Stream Maintenance Program has been recognized for engaging at risk youth through seasonal employment opportunities as restoration technicians on urban streams. These efforts are building ecological citizens through practical training and acting as educational outreach efforts that work towards developing watershed stewardship networks at the community level.

Population and uncertainties associated with climate change has initiated water conservation, water reuse, educational programs, and ecosystem enhancement programs at the county and city level. These efforts are being promoted by national and state policies which layout general guidelines for meeting water quality standards and protecting endangered species and their habitat. Increasing the productivity of existing fresh water resources is a main focus for overcoming the obstacle of creating a sustainable water supply system that ensure access to safe drinking water.

Rural water supply:

1. In Sonoma County there are 40,000 private wells that serve 90,000 residents.
2. California is one of two states in the country that does not monitor ground water quality or the quantity being withdrawn.
3. Overuse of groundwater resources by agricultural users has impacted the quality of groundwater and surface water supplies throughout the Russian River Watershed.
4. Water drawn from private wells is essentially free to the user because of this there are little incentives for people using private wells to conserve water. Thus, the true value of such resources is not well understood in this region.

Obstacles to Rural water supply include:

1. Overuse of groundwater resources by large-scale grape growers is resulting in a dropping of groundwater levels. In some cases natural springs that provided water to rural users have disappeared due to intensive agricultural practices.
2. Groundwater pollution from petrochemical fertilizers
3. Hydromodifications in the form of development is disrupting groundwater recharge.
4. Cost of infrastructure improvements (deeper wells), rainwater catchment, efficient technologies and greywater systems.

Best Management Practices taking shape to overcome rural water supply obstacles include:

1. Water Catchment systems are technological solutions that many rural communities are turning to for water security. Rebates are available for house hold water efficient technologies.\
2. Water Re-use and recycled water systems are taking shape throughout the county that utilize treated water from the city and county waste water treatment plants to irrigate agricultural lands and for commercial landscape irrigation. The goal is for water to infiltrate through the soils and re-charge local ground water sources. Santa Rosa provides recycled water to irrigate 6,400 acres of agricultural land.
3. Throughout the county NGOs are playing a major role in monitoring watershed ecosystems, private well water quality, and educating local citizens about water issues. Such organizations include Community Clean Water Institute, Occidental Arts and Ecology Centers Water Institute, Sonoma Ecology Center, and Laguna Foundation.

#### Summary:

The best management practices that are being implemented throughout the Russian River watershed exemplify how to balance ecosystem services with water supply and demands. Conservation efforts combined with water re-use systems are a strong tool for increasing available fresh water resources. The adoption of appropriate technology and educational outreach programs will help encourage other areas to implement such programs. Enhancing ecosystem functions within a water system is an aspect of water supply that will ensure a greater quality of life and reduce the need for costly water treatment.

#### *Yangtze River and Tuotuo River Case Study*

The Yangtze River is the third longest river of the world, the river originates in the Qinghai-Tibet Plateau flowing 6,300km eastwards through 10 provinces before draining into the East China Sea. The average discharge of the river is 31,900m<sup>3</sup>/s (1,127,000 ft<sup>3</sup>/s) with a basin area of 1,800,000 Km<sup>2</sup> (690,000 Sq mi). The Yangtze watershed is home to 400 million people. Throughout the watershed there are more than 500 dams that disrupt the natural flow of the river. Due to this the watershed as an ecosystem and lifeline has been degraded immensely over the last decade. In this case study we will investigate rural water supply in the upper reaches of the Yangtze basin along the Tuotuo River the headwaters of the Yangtze River. Followed by an urban case study of the Yangtze delta each has unique and critical challenges to overcome to insure future drinking water supplies. The Yangtze River is among the world's most polluted rivers in the world sources of pollution vary from industrial waste, agricultural pollution in the form of fertilizers, herbicides and pesticides as well as from heavy metals. It is also the most important agricultural and industrial areas in China; rapid economic growth in the region is resulting in watershed degradation.

#### Rural Water Supply:

The upper reaches of the Yangtze basin is home to 180 million people roughly 35% of the entire population of China reside in the upper Yangtze basin. Critical challenges in this region include low per capita income, poor labor force, high birth rates, lack of infrastructure and geographic remoteness, which stagnates social and economic development in the region. This case study will investigate rural water supply along the Tuotuo River a major tributary the Source waters of the Yangtze River.

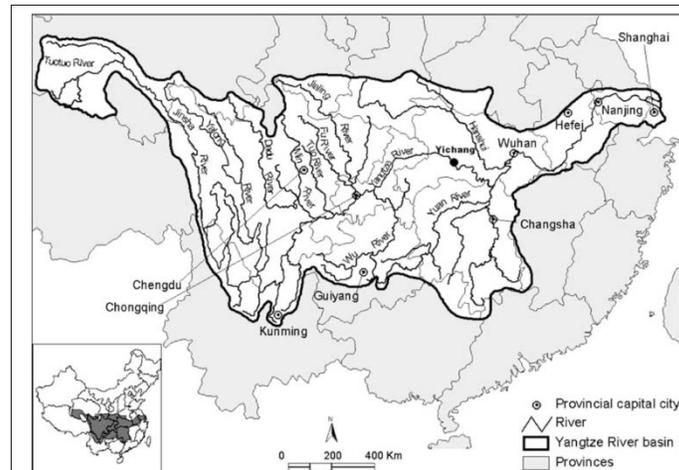


FIGURE 1. Study area in the Yangtze River basin, China.

Above Figure Source (Yan, T., & Qian, W., 2004)

#### Quantity:

The Tuotuo River originates from glaciers in Jianggendiru Snow Mountains on the southwestern side of the Tanggula Mountain Range. In the last 44 years runoff has increased due to the fact that glaciers are retreating, in the long run this will decrease the amount of water entering into the Tuotuo River and the Yangtze River basin.

#### Water supply

Water resources in the area are very limited emerging issues relating to desertification, natural resource disasters due to wind, snow and hail are impacting people's ability to access clean fresh sources of water.

#### Population Growth

Available water per capita is decreasing due to high birth rates throughout the region.

#### Quality

1. Local herdsmen living here reluctantly drink the water from Tuotuo River, clean water without a salty taste is unprocurable for them because it costs Ten Yuan per bucket which is an economic burden. Their only other choice is to walk upstream of Tuotuo River to

find comparatively cleaner water as the water near township has been polluted by growing population.

2. Local teachers who graduated from other schools in and outside the area cannot tolerate the water though they can buy clean water as they get a salary from government, but they are still complaining about the raising prices of fresh water.
3. Lack of appropriate water treatment infrastructure is degrading the quality of water along the upper reaches of the Tuotuo River.
4. Ecosystems throughout the region are in a state of regressive degeneration, 81% of the regions grasslands have been degraded due to climate change effecting sensitive permafrost environments this is increasing soil erosion and turbidity throughout the watershed.

### Best Management Practices

Environmental restoration strategies in the form of reforestation/afforestation have taken shape to enhance the regions environmental system (little information was available regarding the extent of these efforts in this region).

### *Yangtze Delta Case Study*

#### Urban Water Supply:

The lower reaches of the Yangtze River is known as the Yangtze Delta the area is considered to be water rich. However, the rapid industrialization and urbanization of the area has been decreasing the quality of water resources. The region is composed of Shanghai, Nanjing, Suzhou, Wuxi, Changzhou, Zhenjiang, Yangzhou, Jiangsu provinces the areas is about 995,00 Km<sup>2</sup>. The population of the area is 73 million (6% of the total population of China) about 2.5 million reside in urban areas. Rainfall across the region ranges from 950-1,150 millimeters per year, with temperatures ranging between 3 degrees C and 28 degrees C (Marton, 2000).

#### Quantity

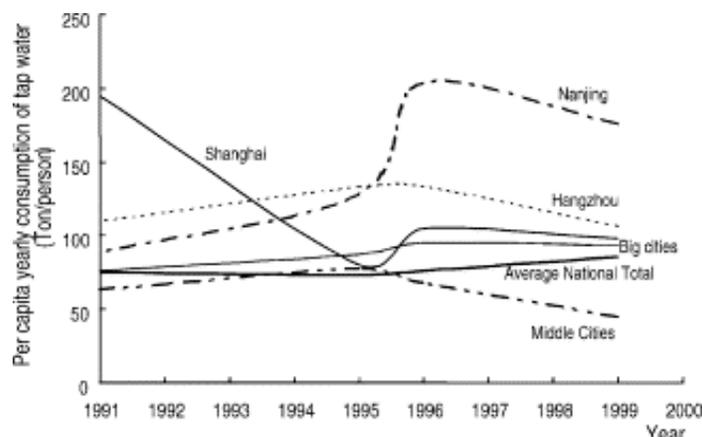


Figure 2. per capita tap water (Gao et. Al., 2004)

#### Quality

1. Tap water in this region does not meet national regulatory standards.
2. Agricultural Pollution -Agricultural output increased by 7.6 percent between 1981 and 1997 (excluding Shanghai which was 4.9 percent). This increase in output also increased the amount of mineral fertilizers entering the watershed from agricultural runoff. It is estimated that  $2.85 \times 10^6$  t TN/year in 1998 entered the Yangtze watershed from agricultural sources (Shen et al., 2003).
3. Municipal Waste - Mega-Urbanization is creating rapid population growth in the Yangtze Delta region increasing the population density and polluting surface water due to lack of waste water treatment infrastructure. It is estimated that 70% of waste water in the region is discharged without treatment into the river (Gao et al., 2004).
4. In mega cities sewerage is 20% (this is based on percentage of urban population with access to sewerage facilities), in large cities it is estimated at 10% (Gao et al., 2004).

#### Best Management Practices In Yangtze Delta Region

1. Beginning in the 1990's the government began implementing water savings programs. In Figure 2 we can see after 1995 there seems to be a decrease of annual per capita tap water consumption

### **Implementation of Best Management Practices**

It is quite apparent that China and the United States each have their own distinct set of issues to address when it comes to access to safe and clean drinking waters in their respective urban and rural areas. In other parts of this project we have outlined and identified some of the key issues that affect that access such as population growth, infrastructure, political structure, capital to fund infrastructure, water quality, and the lack of adequate treatment facilities. There seems to be distinct difference in both the issues each country faces and also in which way they are addressed.

#### **China**

##### Additional Problems:

- Not enough investment
- Investments & decisions are primarily made by the government; should include feedback from public opinions, NGOs
- Not just construction, but O&M should be of equal importance
- More research on environmental protection and management tactics, strength project management
- Lack of EIS/environmental planning before industries (pollution) are put in
- Lack of sewage/wastewater treatment infrastructure
- Desertification – sand storms, etc.

- Not solving the full picture (non-point sources, groundwater, lack of stormwater infrastructure) – maybe because out of sight, out of mind; priorities (resource issues, crisis mode); NGO/civil society voicing concerns
- Competing demands – too many organizations/collaborations (9 dragons is a problem) – lack of accountability/clarity of responsibilities
- Policies loop holes – established too recently, regulations are too vague (big picture/umbrella); not enough regulations to meet specific, individual issues
- Enforcement could be improved – management problem, plus lack of specific regulations make it hard to enforce
- Prior approach of the Chinese government is that economic needs are considered as a priority and often override environmental concerns; now government definitely takes environmental as priority, but the switch is too late, after the fact
- Government prioritizes urban area/infrastructure; many rural areas are not being taken care of, not meeting their needs (partially due to the fact that many farmers are moving to the city because of the economic development, so people are moving to the city of their own volition, placing further emphasis on the city)
- Water rates being too low – hard to conserve (E. of China – have enough water)
  - Rate is based on economic environment – base rate
  - Quality has improved, treatment costs increase and may not match the user rate being charged

#### Problems and Issues relating to Access to Clean Drinking Water:

- A. Pollution
- B. Contamination of the sources of water that they draw from due to lack of adequate treatment facilities
- C. Lack of stricter water quality regulation and oversight
- D. The extreme population in cities such as Shanghai and Beijing contribute greatly to the amount of pollution and contamination of sources of water. (more of a geographical areas of East or West – regional problem)
- E. Rapid economic development has lead to overexploitation of many natural resources.

#### Public Response

Revisions in 2008 to the Law on Prevention and Control of Water Pollution introduced a new measure to Open the Environmental Information. This measure would work towards improving transparency by disclosing environmental information and encouraging public participation according to the Asia Water Project.

Environmental regulatory agencies in China are evolving to better manage water resources issues. Examples include: Ministry of Environmental Protection, State Environmental Protection Administration (SEPA), Various local Environmental Protection Bureau's (EPB's)

#### **The United States**

- Lack of water conservation & reuse in desert areas (Phoenix) – per capita usage higher (pools, grass, lawns, golf courses)
- Water rates being too low – hard to advocate water conservation
- Water rate structure can be revised – many places you can still buy in bulk at a lower rate (ag rate is low)
- Use it or lose it – water rights issue, water wasted in places that may not need it all the time
- Pollution of Chesapeake Bay
- Old infrastructure in some cities (ex. New York)
- Does water quality need to be drinkable at the tap? Dual pipe system or boil as needed for drinking – high quality not needed for washing/irrigation
- Water fountains are underutilized, not needed as much

Problems and Issues relating to Access to Clean Drinking Water:

- A. Supply of the water from our sources
- B. Water rights of the control of the sources of water
- C. Pollution (on a much smaller scale than China)
- D. The difference in our political structures contributes to how each country addresses their obstacles.

Public Response:

- A. In the United States Non-governmental organizations play an important role in overseeing local watersheds and advocating for policies that promote environmental protection.
- B. Public hearings are open for public comment regarding local water resource issues before new bills or policies are voted on and implemented.

In the United States the implementation of various regulations, policies and laws ensure and mandate that states, counties, cities, and their municipalities provide and maintain a certain level of quality and supply of water. For example, the United States has a series of mature laws and regulatory agencies that protect water resources and freshwater ecosystems:

- A. Clean Water Act, Clean Drinking Water Act
- B. Regional Water Quality Control Boards
- C. Environmental Protection Agency
- D. Endangered Species Act
- E. California Department of Water Resources (In California only)
- F. Various local NGO's that help to regulate and/monitor quality
- G. In Sonoma County and Santa Rosa in particular, we have our own water quality testing labs that monitor water quality 24 hours a day / 7 days a week
- H. Policy advocacy coalitions

Discussion:

One of the ways China can use the model of the United States for improving their access to clean and safe drinking water is to increasing the regulation and/or laws of water quality requirements and enforcing them. By creating more powerful laws and/or regulation that require the cities to maintain a certain level of quality, a lot of changes can be made that can increase their quality of water and also help to maintain a clean source of supply. Also implementing the idea of water conservation can drastically change the outlook on the quality and quantity of supply. Conservation is achieved through public outreach and education regarding water use, freshwater ecosystems, and water quality. In large cities such as Beijing and Shanghai, where populations are in the millions the implementation of water conservation programs has the potential to save hundreds of millions of gallons of water. Santa Rosa has a population of about 200,000 people and through our conservation efforts we have managed to save tens of millions of gallons of water over the course of four years.

Something that both countries can do is to improve the water quality directly at the source of water supplies. This can help to ensure that water will be the cleanest it possibly can upon entering treatment facilities. This can best be achieved through local regulation by way of laws and/or ordinances restricting what kind activities can happen near the sources, which will reduce or eliminate any pollutants that may potentially end up in the source waters. Ensuring and maintaining the ecosystem around the source through restoring wetlands and utilizing ecological restoration techniques in riparian areas natural biological filtration process we be restored. This will help increase habitat for fish and improve the biodiversity of the watershed. Monitoring the water supply and utilizing ecosystem enhancement strategies will improve the quality of water and increase safe clean drinking water supplies.

### **Case Study: Implementing Best Management Practices throughout the Mekong River basin**

The Mekong River originates in the Yunnan province of China flowing 4,620 km (2,400 miles) through the Union of Myanmar, Lao PDR, Kingdom of Thailand, Kingdom of Cambodia and Viet Nam. The annual flow is 475,000 million m<sup>3</sup> the river provides water to 70 million people who depend upon the river for drinking water, food, and transportation. New development schemes for hydroelectric dams and large-scale irrigation are threatening the biodiversity of the region and the ability for rural populations to meet their basic needs. The vast majority of people living along the river are living in rural areas at a subsistence level meeting their basic needs from the rivers natural resources and depending upon the river for drinking water. The Mekong is a Transboundary river system that represents a shared water resource with a complex set of obstacles surrounding common pool resources, whose exploitation and use by one party diminishes the benefits of downstream users.

#### **I. Critical Challenges In the Mekong Basin**

- A. **Water Quality:** Water quality is poor near in the Mekong delta due to untreated urban sewage entering the watershed this issue is compounded during dry seasons and during times of low precipitation. Upstream mining activities, illegal logging, industrial pollution, agricultural pollution, aquaculture pollution and dams are all contributing factors to the degeneration of water quality.

B. Source Waters:

Reduction in flow will increase the pollution levels entering the river and degraded the overall quality of water increasing the risk of contaminated drinking water for the people utilizing the river downstream.

C. Climate Change:

Currently low rainfall in the areas is resulting in limited water resources downstream. Retreating glaciers are also jeopardizing future available water resources.

D. Human activity threatening water quantity:

Currently many sectors rely on water from the Mekong for water supply, sanitation, agriculture, fish production (natural and aquaculture), biodiversity, transport, and hydropower. Conflicts are emerging as communities who are dependent upon the rivers water for agriculture are losing supply due to new dams that have been constructed for hydropower generation upstream. This is jeopardizing rural communities' ability meet their basic needs.

E. Development:

Hydroelectric development in the upper reaches of the Mekong in the Yunnan province are diminishing flows and changing the flood regimes of the river system disrupting natural ecosystem processes downstream. There are eight large scale dams two are operating and the others are either under construction or being planned for on the main stem of the Mekong River in China. In the dry season, 40% of the Rivers flow originates in China. One of the most significant impacts of these dams will be on a downstream tributary called the Tonle Sap, which depends on a reverse flow during floods to push water, sediment, and fish into the Great Lake region which acts as a fish nursery and supports a lucrative fishing market.

F. Navigational Development:

Many reaches of the Mekong are not navigable by large boats the Chinese government sees this area as an important transportation hub and has begun dynamiting un-navigable areas. This process is destroying the hydrological complexity that fisheries depend upon jeopardizing the future of many rural fishing communities.

G. Turbidity:

Siltation is a major source of nutrients for agricultural lands along the Mekong River dams upstream threaten to reduce the 160 million tons of silt coming down the river by half.

H. Fisheries:

There are 1,200 fish species in the Mekong river 120 of which are commonly marketed making up 2% of the worlds fish market.

## Implementation Plan

### **Step 1**-Basin wide cooperation

The Mekong River Commission was developed in 1995 as an agreement between Thailand, Cambodia, Lao PDR, and Viet Nam. The mission is to coordinate sustainable development and management of fresh water and natural resources for the mutual benefit of all riparian countries that promotes the well being of the people's. Since the headwaters of the Mekong are in the Yunnan Province of China it is essential to integrate China into the rivers management plan so that hydrology of the river and its natural resources can be best managed.

### **Step 2**-Recognizing the ecosystem carrying capacity:

The Mekong like all river systems has a carry capacity if it is exceeded then the natural resources that sustain the rural populations throughout the basin will begin degenerating. If water quality is degraded it will mean costly water treatment before the water supply is safe for human consumption; this is economically impossible for rural population living at the subsistence level. In the case study on the Yangtze River, overexploitation has degraded the quality of water creating many social issues relating to access to safe sources of water. If the same conditions occur throughout the Mekong River rural populations will be forced to migrate to urban areas creating significant challenges in metropolitan areas.

### **Step 3**-Development of National Policies and Transboundary agreements:

Strong National policies must be developed in China and in downstream countries that recognize the significance of maintaining a high quality and sufficient quantity of water for downstream users. Policies need to stress not just efficient use of natural resources but equitable distribution. National policies in all countries need to recognize the significance of a shared resource and should be developed through participatory approaches that include all stakeholders throughout the watershed.

### **Step 4**-Coordinating basin wide management regimes:

In the case study on Sonoma County, we saw how dams and reservoirs can be used to augment summer time flows for endangered fish populations. This strategy can be utilized in the Yunnan Province and throughout the Mekong basin by simulating natural flood patterns and adapting energy needs appropriately. Coordinating basin wide flood management will also assist fisheries in the Mekong Delta.

**Step 5-** Ecosystem services need to be protected through an integrated management regime. Principles of ecological engineering could be applied throughout the basin in order to develop cost effective natural treatment systems such as wetland treatment systems to insure water quality and protect the unique biodiversity of the area. In the Case Study on Sonoma County we saw how ecosystem enhancement can assist in maintaining high quality source waters. Pairing water supply with ecosystem enhancement is a sustainable way to ensure that rural populations will have access to clean safe sources of drinking water. New research is showing that ecologically engineering the watershed can protect source waters and reduce costly water treatment.

Monitoring:

- A. Inter agency approaches will insure that monitoring is appropriately carried out throughout the Mekong Basin. Creating a cooperative framework that involved Governments, NGO's, and communities will ensure that honest reporting is carried out. As in the Case of Sonoma County where The Department of Fish and Game, National Oceanic Atmospheric Association, the Sonoma County Water Agency all work with NGO's to coordinate efforts according to the Federal Endangered Species Act and the California Endangered Species Act. For over a decade these groups have been struggling to restore fish populations within the Russian River watershed. The commercial salmon industry in the region has been shut down for numerous years disrupting the economic vitality of the region.
- B. The Mekong River is among the least modified major river system in the world. With the headwaters in the Yunnan Province of China the country has a responsibility to protect the biodiversity of the region. In 1992, at the United Nations Conference on Environment and Development at Rio de Janeiro China signed the Biodiversity Convention. It was ratified on January 1993 exemplifying China's obligation to protect not only the biodiversity within its territorial boundaries but also the countries actions which may impact the biodiversity of countries downstream. The United Nations should monitor the actions of China and require mitigation if the countries development strategies impact the biodiversity downstream.
- C. Access to drinking water from the Mekong River has been a natural right of Riparian Communities for centuries. Rapid development along the Yangtze River has deteriorated the quality of drinking water showing the unsustainable tendencies of China's development strategies. We should expect similar trends in the Yunnan province and throughout the Mekong River basin. However, if sustainable development philosophies are implemented in coordination with the Mekong River Commissions sustainable management regime it could be possible for China to show the world how to develop green infrastructure and green economies. The Mekong River Commission working in cooperation with China could monitor sustainable development efforts and coordinate a basin wide management plan.
- D. Developing green economies is a means towards alleviating poverty throughout the Mekong basin. Utilizing local communities as labor forces for ecological treatment systems would insure future clean water supplies throughout the watershed. This would allow rural communities the opportunity to gain knowledge and skills developing wetland treatment systems that could be integrated into aquaculture facilities to provide both protein and clean water to rural populations. The development of NGO's that work towards sustainable management regimes could allow China to cooperate in meaningful regional development strategies that benefit all stakeholders throughout the Mekong Basin. Such a scenario would

incorporate public-participation in long-term watershed monitoring activities allowing the people who know the land the best to act as the rivers stewards.

## **The Group's thoughts on ways to balance economic activity with the health of the environment**

It is important to begin by understanding how each government (and society) views sustainability. Again, as the two countries are at different stages of economic development, each will have different view of sustainable development. For China, the government has tried to find a balance between its attempt to raise living standards while simultaneously wanting to implement more sustainable actions. Is it possible to find that balance, to resolve that conflict? In the United States, there is less emphasis on raising living standards, but instead there is an emphasis on taking actions which do not result in eliminating jobs (especially in the economic downturn caused by the financial crisis in 2008-09). Is it possible to create jobs which address sustainable development or re-development in a modern economy? The Obama Administration has pledged to create five million 'green' jobs in ten years, but these jobs have not yet fully materialized (and there is continuing lack of clarity as to what is a 'green' job).

Locally, governments in each nation tend to only take responsibility for their own region, which acts (sometimes unintentionally) to push the problems/pollutions into other cities or regions. As noted, the United States has the federal government to resolve problems when state governments don't agree (although it is not as efficient, and compromise tends to inhibit the ability to fully solve the full problem of the seemingly inherent conflict between economic development and sustainable development).

There are examples of existing practices in each nation which have been implemented to resolve these problems. For example, in the United States, there is S. 787 (not approved) which updated the Clean Water Act. In China, municipal governments have begun to distinguish between water used for drinking and agricultural needs versus the needs of industry depending on the quality of the water. However, this practice becomes less practical in the introduction of manufacturing higher value electronics or pharmaceuticals, where water quality is an important factor in production.

Additionally, China has worked to concentrate industries in one area which acts to limit the need to transport water (which reduces waste), while in the rural areas, a more decentralized treatment practice is employer, where water is first treated and used for human use, then is reclaimed and used for smaller factories.

So, how can we balance economic development while protecting the environment? In China, there are three important factors which determine the success of any effort. These include, funding (typically from the government), people (typically sourced by the government) and management. It is this final factor which is the problematic for China, as it lacks resources for monitoring and its overall water management training needs improvement. There is no

comprehensive development plan which takes into account long-term water needs, and many projects are built with short-term gains in mind. In addition, human resources need to be more efficiently and effectively applied. Often, a person's skills do not match their jobs, and there are not enough trained and experienced experts for these jobs.

In the United States, public offices conduct monitoring, along with local NGOs within the watershed. Cities also monitor water quality. So, the infrastructure is already in place, and it all computerized so there is a more comprehensive view of conditions, and which requires fewer skilled workers to manage the system. Sustainable development is more overarching, but there are problems with environmental justice, as landfills and pollution are sited in poorer, underprivileged areas within a city (whereas, China tends to push pollution to another city). Improvements are made, but not in a holistic ways that better addresses a region's/(or the nation's) ecology.

In both nations, resources need to be allocated more efficiently.

The group recommends:

- Exchange ideas, thoughts and experiences between countries
- Increase shared best practices of methods of monitoring and overall improvement of management
- Create a transnational network to gather and shares ideas on developing and implementing development projects
- Cross-train experts in both China and United States to encourage consistency in skills base
- Balance science and policy development and implementation; create policies based on science (decide on thresholds, targets, need to allocate rights for environment and not sell it all to industries)
- Build, operate, transfer BOT
- Increase the number of projects that transfer to best technology
- Increase the number of water right markets (industries have to pay for improvements to free up water allocation for their use)
- Improve productivity of water (use water multiple times)
- Incorporate long-term goals and strategies into national and local planning
- Include the public and local NGO feedback in the decision-making process
- Improve management of resources at all levels
- Provide economic value to ecological services
- Develop policies or regulations regarding watershed management that includes compensation for ecological degradation, water resource management and pollution control
- Encourage more effective collaboration between government departments (or some departments should be combined) to monitor and oversee the policy implementation

## **The Group's Thoughts on Engaging the Public**

Pollution, over consumption, and poor distribution have led to most of the problems China and the United States face regarding water management. Despite common problems, methods to address these issues diverge based on their Chinese or American context—a result of history, population and development trends, and local mechanisms for government policy and project funding. Nevertheless, the role of public engagement, or improving the environmental awareness and action of local people, is essential in both countries. In this paper, we will frame the context of water for both China and the United States, discuss the importance of public engagement in addressing water issues, provide best practices for engagement in each country, and finally, pull from these examples to illustrate how varied best practices from both countries can be combined for successful implementation of new projects.

### ***Framing the Issue***

Historically, most water projects in China and the United States have been driven by economics and convenience. As a result of this forward pushing development, today both countries face water conservation problems.

### ***Environmental Context of China***

With rapid economic development in the People's Republic of China (PRC), the environment is changing at an astounding pace. Much of the environmental degradation felt today is a result of this development, particularly in the last 60 years. The Chinese people want a better life, a common desire for material civilization and the benefits of high technology, but they have inadvertently paid a heavy price for it. While striving to create a comfortable living in the world, they have accelerated their environmental destruction and must now act quickly to avoid serious consequences. China's increasing population, a migration towards urban cities, and rapid industrial development are all factors contributing to negative environmental impacts. The lack of drinking water in rural areas is growing more severe, as is exposure to contaminated water (a result of non-compliance by various factories). The Chinese government has many ministries with a focus on the environment, such as the Ministry of Environmental Protection (MEP, formerly known as SEPA) and the Ministry of Water Resources. These ministries work with local mayors and research institutions to monitor water resources on a regular basis, for water quality and safety. Especially in urban areas, these measurements are performed with dynamic real-time monitoring instruments.

The Chinese government routinely outlines a "Five Year Plan" of economic initiatives the country hopes to achieve; government entities and state-owned companies follow these specifics when charting out new projects. In the upcoming 12th Environmental Protection Five Year Plan (2011-2016), the Chinese government plans to execute an "ecological environment compensation mechanism" pilot program. In this procedure, China would work actively to direct commercial banks and social investment to environmental projects. Companies and consultants who wish to work on these projects can also send bids to the Ministry of Environmental Protection (MEP). In addition to government-based support, environment and water projects are also funded by finance institutions such as the World Bank and the Asian Development Bank. Municipalities interested in improving their water and wastewater infrastructure request loans

from these banks, and consultants compete to work on the projects. In addition to government and external funders, non-governmental organizations (NGOs) play a large role in the PRC.

International actors such as The Nature Conservancy and the World Wide Fund for Nature (WWF) challenge China to follow global trends towards conservation. Likewise, China-based NGOs work with local communities to improve environmental awareness and community-based projects. (In fact, the first NGOs in China worked for environmental protection.) Still, as rapid development continues there is a great need for better environmental awareness among the Chinese people.

### *Environmental Context of the United States*

The historical American approach to water management was for economic and social development. Government agencies such as the Army Corps of Engineers helped private enterprises construct water facilities for economic progress. As more people moved to the arid West, the US Bureau of Reclamation built large infrastructure projects to divert water to the region. In addition, huge construction projects such as large dams were implemented to jumpstart the economy during the Great Depression of the 1930s.

Industrialism and economic growth focused water management primarily on infrastructure projects.

In the middle of the twentieth century it became evident that legislation was needed for protection. The Federal Water Pollution Control Act of 1948 was one of the first laws to address this need. After its establishment in 1970, the US Environmental Protection Agency (EPA) made amendments to the law; its 1977 amendments restructured the act into what is now known as the Clean Water Act.

Still today, legislation provides the framework for environmental management in the USA. Industries, in theory, must follow these regulations or else pay fines. And yet, policy is not the only manager of the country's water. Non-governmental organizations are increasingly putting voice to the country's environmental issues and organizing their own projects to protect lakes, rivers, and watersheds. These NGOs educate the community and lobby the government towards necessary improvements. Businesses are also beginning to follow the environmental movement with more sustainable business practices. Through all of these efforts, however, it remains clear that the biggest issue in the US with regards to water is over consumption, and a lack of awareness about this consumption.

### **Role of Public Engagement**

“Engagement of the public,” as we have defined it, is the improved environmental awareness of all stakeholders so that all needs and perspectives are incorporated, and so all stakeholders take an active role in water conservation. Public engagement is a crucial step in effective water management. It goes past typical stakeholders to reach out to marginalized members of the country (whether that be ethnic groups in China or minority groups in the US) to make sure the community's traditions and voices are heard.

Currently there are many small efforts to engage the Chinese and United States public, but much more work needs to be done.

### *Public Engagement in China*

The environmental awareness of Chinese citizens must still be improved. Because different regions have different levels of education, civic quality varies and thus awareness of environmental protection becomes uneven. Some people are aware of environmental issues, but a strong campaign is still not in place to take timely and effective measures to protect the ecological environment. School education is the critical link toward educating the younger generation in China. Environmental publicity drives at schools are not uncommon, but more needs to happen. Instilling environmental awareness within classroom education has unparalleled advantages, especially in a country that holds its middle and high school education to such a rigorous degree. In practice, teachers need to discover exciting ways to relay environmental information to their students. Through strengthened thematic activities, young people can deepen their understanding of environmental protection. For example, students can learn to implement their own environmental projects. They would learn to survey a potential problem, decide the direction of a project, collect and collate information, draw conclusions, and then take further social action. Encouraging students to do their own research projects is an effective way to raise awareness of environmental protection, and it helps contribute to a lifelong interest and effort in conservationism. Furthermore, such projects can encourage students to pursue further study or careers in the environmental sector.

In addition to education, the economy and governmental policies have an effect on change. For various Chinese industries, especially in power plants, pharmaceutical and chemical companies, and other large water consuming entities, a series of sewage permits help improve the company's industrial water recycling through economic incentives. In addition to affecting the day-to-day, these permits also encourage improvements in production technology and water utilization. As businessmen save money, they increase their awareness as well.

However, governmental regulation and financial incentives are not enough to compel people to do environmental protection work. In addition to the environmental ministries, a push for environmental education requires the support of many stakeholders, such as the media, local communities, law enforcement units, and non-governmental organizations. The combined efforts of these groups would fully enhance social environmental awareness and practical action. Such coordinated work already has led to special activities such as "World Environment Day" and "National Tree Planting Week," all with an emphasis on the universal improvement of environmental quality for the whole community.

China is home to 55 different minority groups. Oftentimes, these ethnic groups become overlooked during the country's rapid development. Not only do their traditions and local culture suffer, but their ecological environment as well. For many of these people, such as the Naxi of

Yunnan or the Mongols of Inner Mongolia, their livelihoods and spiritual traditions correspond directly with a sustainable approach to living with nature. Hundreds to thousands of years old, these traditions once promoted a symbiotic relationship with the environment. Engaging the public, then, includes their participation within environmental projects. Likewise, it includes educating the rest of the Chinese public about these rich indigenous approaches to environmental management.

### *Public Engagement in the United States*

While environmental awareness in the United States is improving, it is certainly still lacking. In the US, awareness varies from region to region. Water conservation is a huge concern in California due to its recurrence of drought, while states near the bountiful Great Lakes seldom worry. The most common form of public awareness is “there is a problem, but I don’t contribute to it.” Many Americans live at a “disconnect” from the natural world, far removed from the processes that bring them their food and their water.

In this way, the negative impacts of American production and consumption go unnoticed, along with the potential to change human behavior and reverse the system. In the United States, the main need is a change of behavior. Many Americans live with a sense that their resources are limitless: sprinklers for landscaping eat away at available water, a huge house with only two people might have all the lights on, countless cars on the road carry only the driver. A simple change in behavior would drastically limit the United States’ use of natural resources. The problem is making that change in behavior is not that simple.

In the US, the media plays a key role in motivating people’s behaviors; people follow trends based on what the media dictates. However, despite its strong force as motivator, the media can have a negative effect as well. Watching news clips on TV, listening to digests on the radio, or reading articles on the internet all help distance the individual from the impact of environmental problems. People believe the media, but most do not think it will happen to them. Nor do they take the time to really understand the problems... until it directly affects them. As an unbiased platform at its most basic level, the media sponsors both un-environmental messages as well as environmental messages.

While children’s television shows teach of saving the planet, wealthy industries might create persuasive campaigns supporting products with poor environmental impacts. The US media is a powerful outlet, yet it can be a powerful persuader in the wrong direction.

The public needs to be educated to think critically of where their information comes from. And further, they need to think critically about the relevance of water to their lives. Once people change their behavior, governments and business will be forced to adapt. This cause and effect equation works in both directions; governmental and business pressures can also influence public behavior. For example, new “bag bills” in the United States will require vendors to charge customers for plastic bags. Hopefully, this will reduce dependency on plastic bags and encourage people to bring reusable ones. Companies, too, can impose restrictions on their workers to use public transportation or curb wasteful habits, thereby teaching their employees smart environmental behavior.

Efforts of local organizations also bridge the environmental disconnect through education. Many non-governmental organizations run outdoor and environmental education programs with youth to instill a sense of stewardship within the minds of young people, hoping to change behavior. Field outings, environmental science trainings and seminars, neighborhood-wide programs, and social events facilitated by these organizations increase knowledge among young people. If changing behavior is the best step towards better environmental management, it is crucial to influence younger people—before bad habits develop.

## **Examples of Water Management**

### *Projects in China*

In China today, more and more people are aware of environmental problems and are taking actions to change the situation. In the past 10 years, governments and NGOs have begun to implement projects to address the threat of environmental degradation. The following profiles two examples of environmental projects in China and shows the varied approaches to development: smaller community-based development and larger government-sponsored development.

#### Community-Based Development

The Mongolian ethnic groups of Alxa, Inner Mongolia respect and value nature. Alxa is the driest region of China's Inner Mongolia province, which is just south of Mongolia. The production mode, lifestyle, morality, and customs of the Mongolian ethnic group are all deeply influenced by Buddhism, which emphasizes ecological balance and metempsychosis. Alxa's environment was once sweeping grasslands, and Mongolian herdsmen restored their water and pasture resources by employing rotational grazing.

Children were educated to protect and appreciate the lives of everything surrounding them. It was the power of faith that made this piece of land rich and helped the residents live a peaceful and sustainable life. However, the so-called agricultural civilization of the Han group (China's majority) was introduced to the area when a large population migrated from neighboring Gansu province. These newly arrived people cultivated the land for agricultural development, and the two cultures began to merge year after year. Mongolians learned how to grow forage for cattle, such as corn and clover. They gradually kept animals in shelters and eventually settled down in permanent residences, instead of the traditional migration. In the 1950s, the Chinese government encouraged agricultural development all over the country. As a result, Alxa's small agricultural plots were expanded and developed to take over the remaining land. Much of local grassland was destroyed in the process, and a large quantity of surface and underground water was used for irrigation. The change in environment led to increased desertification and sand storms. As time went by, the younger generations surrendered themselves to material comforts. Although some Mongolian customs survive today, the culture's religious beliefs are no longer as strong as they used to be. Many herdsmen left for jobs in towns and cities, leaving the almost bare land behind. Children were sent to Han schools in order to adapt to a modern education and examination

system. As the Mongolian culture weakens, their once successful environmental management is lost as well.

At present, Alxa faces five crises:

- Broken current of rivers, shrunk or dried up lakes and swamps
- Lowering underground water level, deterioration of water quality
- Fragile forest ecosystem
- Degradation of grassland ecosystem
- Severe desertification, frequent sand storms

A Chinese non-governmental organization called Society of Entrepreneurs & Ecology (SEE) started desertification control projects in Alxa, Inner Mongolia over six years ago. Our team member Zhou Ying was project officer for these projects.)

At the beginning of these projects, SEE set up management committees among the local villagers. It was imperative for SEE to show the community that they were just an investor and adviser, since it was the local people themselves who should be the host and main executors of projects. Such participatory work is critical in development projects.

An external visitor is unable to identify the real needs of a community without the help of the people themselves. Similarly, the visitor does not know what assets the community brings with them to contribute to a project. The goals, input, and methods used must be a direct result of the wants of the community.

The community-based projects initiated by SEE focus in two fields: irrigation and agriculture structure. One such project focused on water-saving practices within three villages. In the village of Helan, named after the mountain with the only remaining water supply, the National Helan Nature Reserve was established in 1992. Herdsmen used to live in the area but had been forced to move out. After nearly twenty years of cultivation, the level of groundwater is lowering by 10-20 cm annually. It is predicted that in another two decades, water in this region will totally dry up.

Last spring, in partnership with the Zhangjiakou Academy of Agriculture Sciences, SEE launched an experimental project to grow water-saving millet, a grain that consumes only one-third to one-half the quantity of water needed by wheat and corn (Alxa's most popular crops). 17 households received free seeds to sow in their farms, at an area of 49,400 square kilometers. During the harvest, farmers were pleased to see that on average they earned 500 RMB more than corn for every 666 square kilometers. The remains of the millet are perfect food for cattle as well, so the farmers saved by not having to purchase extra forage. Beyond this economic growth, it was proven that millet cultivation uses 360 cubic meters of water, while corn used 500 cubic meters.

At the end of the project, experts, farmers, and local government officials took part in a forum to discuss the outcomes. While it might seem like only a few farmers benefited from the project, it was a step towards understanding methods to help communities, while decreasing their

environmental impact. If similar kinds of water-saving plants are sowed in Alxa, less water will be consumed so the groundwater will have time to self-restore.

Bit by bit, the water crisis in this area can be averted. Villagers who hesitated to join the water-saving project at the beginning are now showing confidence to plant millet next spring, with the help of the local agricultural department. Of course, difficulties exist. External factors such as the market for crops and climate change might change the outcome of the harvesting, but nevertheless, it is a good step in the right direction.

### *Large-scale Development Projects*

In Yunnan Province in the south, water pollution is also a problem. Dianchi, the biggest lake in southwest China, is located in Kunming, covering 2,920 square kilometers of watershed area. Because of its important role to the local residents, it is often called the Pearl of Yunnan. In the 1980s, according to the national standard, the water of Dianchi Lake was potable; it could be drunk directly without treatment. As population increased and agricultural and urbanization pressures grew, by the late 1990s the water was no longer drinkable, and it could only be used for irrigation. Starting in 1998 the water became totally useless, marked as Grade V: unfit for even agricultural and industrial uses.

Thus, the cause of Dianchi Lake's eutrophication was the pollution in the discharge and process system, namely:

- Over discharge of wastewater without or with simple treatment
- Limited facilitation and drains network
- Lack of mitigation techniques and measures in rainy seasons
- Poor self-purification capability

The impact of surrounding industry and agriculture ultimately overloaded the system, and in 1993 Lake Dianchi suffered from severe algal blooms. Investigations from the Chinese environment department said there were over 60 sorts of harmful substances in the lake, leading to the rapid eutrophication that killed the lake's ecosystem.

Beginning in 2003, the World Bank funded the Lake Dianchi Aquatic Biodiversity Restoration Project, with the Yunnan Department of Finance acting as Borrower and the Institute of Zoology at the Chinese Academy of Sciences as implementation agency. The World Bank project aimed to return the lake and its habitants to their "natural state," through targets of wetland management and restoration, surveys, monitoring, and species conservation, capacity building and training, and awareness and environmental education.

The project incorporated a variety of stakeholders, including the project community, local associations, municipal government, regional research institutions, and international wetlands organizations. A survey of the towns in the project area identified possible participants in the lake restoration training—including workers, farmers, and students. Additionally, a risk assessment, cost analysis, project plan, public involvement plan, and monitoring and evaluation plan were all a part of the project management process.

### *Projects in the United States*

In the United States, while the government enacts various projects to address environmental problems, such as through the US Environmental Protection Agency (EPA) or local municipalities, much work is accomplished by smaller organizations. These organizations can both work with or against the government to bring about a change. The following highlights these different approaches to water projects, including working with governments, lobbying against existing government practices, using the market to stimulate change, and using education to drive awareness.

### *Market Driving Change*

Green roofs are an up-and-coming method for storm water management. In the United States, most urban and commercial centers are massive blocks of impervious surfaces. These impervious surfaces have two downfalls: 1) they do not slow down water runoff, leading to flash flooding and 2) they channel the city's contaminants into the rainwater, which then discharges into rivers and streams. Green roofs address these problems by slowing down the water runoff and filtering out contaminants, while providing a place to grow a garden and contribute extra oxygen to the atmosphere. (Such technologies will be showcased at the 2010 Shanghai World Expo in China.)

The Green Roof Rebate Program works with the District Department of the Environment (DDOE) to implement a pilot plan for green roofs in Washington, D.C. (Our team member Lee Cain is working on the project.) The green roof subsidy program provides an incentive for green roof installation on buildings in the US capital. By making installation more cost effective for developers, it is anticipated that green roof technology will catch on, reducing the chance for flash flooding and erosion. The project's funding currently comes from the current stimulus package administered by the US federal government, though different sources of funding must be secured for the future. In addition to storm water management improvements, the local public is attracted to these low impact development features—adding to the increased benefits of the developers. In many cases, people will pay extra money to have these features installed in their homes or businesses.

The Green Roof Rebate Program is an example of the market driving the change. In many ways, it is also a result of media, information exchange, and a general attitude shift that is moving toward a critical mass in our country. The growing trend towards the public wanting to contribute to the environment (though at the least behavior change as possible), makes it a good step in the right direction.

### *Pushing Government to Act*

The Anacostia Watershed Society uses advocacy, education, and stewardship to restore the Anacostia River in the east of the United States. From 1999-2006, the group led a lawsuit against a local Washington D.C. municipality (the Washington Area Sewer Authority—WASA), for the estimated 3-billion gallons of run-off/wastewater entering local rivers each year. The case went

to the U.S. Supreme Court and WASA was found to be in violation of the Clean Water Act. As a result of the lawsuit WASA will need to reduce the amount of runoff by 99%. Within 4 years they have already reduced 40% simply by fixing routine maintenance problems that had not been addressed for approximately 80 years. The plan for the other 60% is to build giant tunnels under the city of D.C. to hold the water until it can be treated. This solution is estimated to cost over \$2 billion. Many believe that, rather than this expensive infrastructure build, it would be less expensive to retrofit existing structures with Low Impact Development devices—much like the installation of green roofs.

### *Educating the Public*

The River Rouge Education Project, in southeastern Michigan, teaches mostly middle school and high school students (sixth through twelfth-graders, ages 11 to 18) about the necessity of the Rouge River and other waterways in the state of Michigan and its effect on their daily lives. Younger grades can participate but are not allowed to do some of the testing due to the chemicals used. The Rouge River Watershed is approximately 467-square miles and flows out into the Detroit River, which has been a major shipping area since the invention of Henry Ford's car assembly line in the 1900s. In addition, the Rouge flows through 48 municipalities with a population of over 1.5 million people, giving it plenty of opportunities to collect trash, hazardous materials (such as oil, coolant and other leaking substances), salt and other non-point source pollution. Storm drains lead directly from the roads of southeastern Michigan to the Rouge River Watershed, down the Detroit River to Lake Erie, then to the Saint Lawrence Seaway and finally the Atlantic Ocean. Another issue is combined sewer overflows. This occurs when wastewater experiences an influx of storm water runoff during high rain periods or melting snow. As the sewers overload, storm water and wastewater combine and discharge from overflowing ports—directly into the receiving streams without treatment. With the Rouge River being one of the most well known rivers in southeast Michigan, one would think that it is very clean and well taken care of. Unfortunately, the opposite is true. No one is allowed to swim in the river due to health risks and the local animal population has plummeted. A major clean up of the river was performed in the 1990s, when trash could be seen floating in the river. Today, the Rouge has come a long way, but it still has a long way to go.

The Rouge River Education Project is about volunteering: educating one's self about water quality and promoting this awareness to children, primarily middle to high school students and their parents. Through training sessions, the project teaches students to measure total phosphate, nitrates, changes in temperature, dissolved oxygen, biochemical oxygen demand, fecal coliform bacteria, turbidity, total solids, salinity, pH levels, and other chemical testing. The training also includes teaching students about water appearance, water odor, surrounding land uses and other physical parameters. The significance of this education is huge. Most of the participating kids are from the inner city and never get to go outside to a park to learn. Here, the kids get to learn about chemistry (and reactions of water with certain chemicals), and they get to see how healthy the water really is. This real life experience seems to have more impact than standard experiments in a classroom lab. The measurements recorded are then sent to the county's database on the health of the river water. (Friends of the Rouge, *Guide to the Rouge Education Project*, 2006)

Most of the children know that their water comes from a treatment place but they do not know the source of that water. When they realize that part of their water is from the Rouge River that feeds into the Detroit River, they start to understand the importance of keeping the water clean and protected. They understand that benthic animals are indicators of healthy ecosystems with good oxygen levels. The water might not be clean for us to drink but knowing fewer pollutants are in the waterways is important. In essence, this project affects the children who live around Detroit. They go home to tell their families about the drinking water and knowledge is passed on to others. This is one of the best ways to get children who are unaccustomed and almost afraid of nature to understand that they are stewards of the earth and must protect it like everyone else.

Teaching children science that applies to something they use on a daily basis brings light to the situation. Teaching adults how to take care of water issues (as in testing for clean water and knowing what to look for) is also important and fun. Getting the teachers involved at the students' schools gives them the opportunity to learn new things. Further, getting inner city kids and any kid outside is always important and needs to be encouraged more often.

### **Process of Project Implementation**

In both China and the United States, projects can be implemented by the government, by local organizations, or by the local people themselves. Most often, funding determines the implementation of a project. For this reason, typically governmental agencies or organizations funded by private donors and/or government agencies enact water projects.

Currently, many projects are being funded by federal stimulus packages in both countries, though businesses, venture capitalists, and foundations all contribute to the cause. In China, funding also comes from financial institutions, such as the World Bank or Asian Development Bank. In this section, based on our experience, we will explain the process that non-governmental organizations follow when implementing a project.

#### *Implementation in China*

The process typically followed in China can be briefly divided into two sorts. One is the most common method most NGOs follow. First is the preparation phase: a problem happens; people go to the field to investigate; a proposal including target regions, benefitting groups, goals, indicators, input, outcomes, budget, time plan, tools, main activities, etc. is written to a foundation, company or embassy for financial support; and then a baseline survey and needs assessment are completed in project locations. Second is the participation phase: local government and community residents are informed of the project's purpose, benefits, and impacts. Sometimes this phase is tough and time consuming; when many stakeholders are involved, at varying levels of commitment, coming to a good agreement for action is challenging. However, project officers cannot stop lobbying until both the government and local community understand and agree with the project. With this agreement, the project is launched and executed as scheduled.

Monitoring and evaluation (ME) is conducted depending on the size of the project, usually at the middle and end of the project timeline. Lastly, final reporting and outcomes are handed to the

donors. The Society of Entrepreneurs & Ecology (SEE) offers another method for project implementation. SEE is founded by over 100 Chinese entrepreneurs, each of who yearly donate 100,000 RMB (US\$14,650). Thus the fundraising step can be skipped. SEE greatly encourages project management committees, consisting of the local community, to apply for projects (please see example projects in section 4.1). SEE also asks that the villagers seek matching funds from local government or other organizations. By doing this, different parties are engaged in the project. Opinions, advice, and lessons learned are exchanged across a wide variety of stakeholders. Once the project has been implemented, monitoring and evaluation procedures ensure proper outcomes. Good project management, a clear finance record, and media promotion are important in both approaches to implementation.

### *Implementation in the United States*

There are different ways that projects can be implemented in the United States. Generally a NGO begins when a need is identified in the community and an organization is founded in order to meet that need. The organization declares its mission and then seeks funding to solve various problems aligned with that mission. Funding sources vary from government, foundation, or corporate gifts to revenue streams and public membership. When seeking funding from the government, the organization submits a proposal that must demonstrate the relevance of the project, declare intended outcomes, outputs and goals, and how it intends to evaluate them. If and when awarded the funding the project commences and the organization reports on its progress at various stages.

With foundation and corporate grants an organization will sometimes be required to state exact outcomes, outputs and goals, but often these are generalized. Most NGOs have a membership where people who care about the issue and the cause of the organization can donate money to the organization on an individual basis. NGOs can also sell a product or service in order to advance the mission of the organization as long as over a certain period of time the organization can prove that it is not profiting from the revenue stream. Additionally, individuals or families of wealth will sometimes establish foundation-based organizations where the organization has the benefit of a large financial base. NGOs generally fit into the category of 501(c) tax-exempt status. These non-profit organizations are exempt from federal income taxes. A 501(c)(3) organization is eligible for government grants, but is limited in terms of its ability to lobby for legislation and also limited in that it cannot participate in political campaigns or elections due to conflict of interests. On the other hand, a 501(c)(4) organization has the ability to fully lobby for legislation and has the ability to participate in political campaigns and elections, though it is not eligible for government grants. NGOs depend on government and foundation grants, corporate donors, various revenue streams, and public membership to survive.

In many cases government grants are imperative to the survival of an organization and therefore most NGOs fit into the 501(c)(3) category. In many cases these organizations are not able to compete with developer businesses because of their limited ability to impact legislation and participate in politics. Often a small few benefit at the expense of many in terms of environmental degradation. 501(c)(4) organizations often depend heavily on membership as a funding source. Since these organizations are better able to compete with those controlling the politics in the favor of environmental degradation (often a very small part of the community, but

with large financial resources), it becomes even more imperative that individual citizens become aware of the issues so that they can support groups that can compete in the political world in favor of the majority and the environment. Currently in the United States, the majority of political campaign funding comes from business with business interests.

## **The Group's thoughts on development of long-term policies which have realistic chances to make significant gains in fighting environmental degradation**

The delegation met in Shanghai at the end of the visit to China by the American participants. This provided the opportunity to meet each other in person, and to discuss and debate water management issues in each country from their own perspectives. The group channeled their ideas into the following ways in which United States and China need to take a global view of access to clean water. .

- Propose a treaty that established a commission between all the countries that have a stake in a specific water source (water basin or river or lake) that provides each with an equal say in the way the source is used (ex. Organisation pour la mise en valeur du fleuve Sénégal – an organization which manages the development of the Senegal River)
- Establish a water rights market between countries, and have each country pay for improvements or treatment before it can get access to it
- Develop an understanding of the comprehensive life of the resources – as well as life of the people – on a water source (understanding the implications of doing so across national boundaries)
- Nations need to work together to address desertification (for example, the Gobi Desert between Mongolia and China) or coastal erosion
- Build an integrated understanding of the hydrologic cycle among all nations which rely on a water source (include groundwater, surface water, greywater, rainwater)
- Develop and implement effective management plans, including data collection comprehensive monitoring (for example, use GIS software to create an interactive electronic resource that includes global water quality)
- Inspire all sectors of society to influence government
- Standardize international treaties/alliance/initiatives to include consideration of use of water resources (for example, the Kyoto Protocol)
- Establish a ‘sister cities’ program that pairs up cities that have similar problems to allow them to share best practices
- Advocate conservation in nations and regions which have an abundance of resources
- Work together to develop best practices plans of action to rehabilitate aged facilities
- Take into consideration environmental justice in all planning – both domestically and internationally.

## **Next steps**

The virtual collaboration and exchange of the emerging young professionals concluded in a meeting of the participants in Shanghai. In addition to sharing their impressions with each other, the group discussed ways in which to build on this experience and to share it with other individuals in both nations. Together, they organized a list of opportunities for exchange that came out of the program; they offered ways to inspire the next generation of young people to become more involved in environmental issues; they drafted a plan to build a website that could educate people in ways in which China and the U.S. can work together to address water management issues; and, they created a best practices education project proposal.

## **Opportunities for Exchange**

As this program included persons from academia, local and national governments, the NGO community and the private sector, a variety of potential collaborations were proposed by the group. Among those that were articulated at the end of the program are the following:

- Develop partnerships between NGOs in both countries which share best practices on water efficiency.
- Create internships and training positions for emerging young professionals in each nation.
- Establish partnerships with organizations such as Water for People that can share best practices in efforts to curb waste.
- Build a network of NGOs that can implement civic education that will help to grow civil society efforts and related research.
- Establish a cooperative research program between East Carolina University, Ningxia University, and Western Connecticut State University addressing water scarcity in Yingshuan through soil water detection, ground water detection, and policy exchanges. The goal of the exchange will be to include undergraduate exchange in the program with an interest in setting up water rights markets through the research.
- Develop exchanges of environmental student leaders between IFCE and the Jane Goodall Center
- Create common research agenda on climate change and ground water between universities in China and the United States
- Develop joint research efforts that look at access to potable water in rural areas
- Encourage more emerging professionals to engage in student exchanges

## **Inspiring the Next Generation**

The group offered specific examples of ways to reach out to the next generation of environmental stewards:

- Chris Kukk developed a partnership with the Jane Goodall Institute's Roots and Shoots program

- Alex Manda introduced the Go-Science Center in Greeneville, NC, an effort which works with university students to motivate K-12 students to get more involved in science. He is involved in developing and expanding this program, and is particularly interested in doing so with underrepresented students.
- Queenie Tsui suggested establish excursions in the U.S. and China for college and high school students which would focus particularly on ground water.
- She also suggested teaming up with Chinese city administrators to replicate her efforts at mentoring middle school students for future cities competitions (in which teams design models to get people to work together to address environmental problems).
- Zhou Ying proposed to expand educational field trips for children that include direct service projects that her organization in China currently offers.
- Eric Hartman plans to integrate environmental science angles into annual water walks in Pittsburgh, PA and Morgantown, WV (about 1,000 participants, mostly young)
- Lead Water Issues / Water Policy University Course
- Bill Christensen suggested shadowing and mentoring programs for young people that would help to raise awareness of the growing number of green jobs in different areas of the economy.
- The group agreed that it was important to use real world experiences and to apply new technology to enhance students' interest in science (for example, using gravity-based water harvesting system in an introductory fluids class)
- Hu Ying noted it was possible to use the Asian International Research Center and Mekong Research Center as entry points for getting more young people involved and interested in water issues.
- Chris Kukuk introduced the Stewards of Water Network (SOWN), an effort that gathers together people who do ground water monitoring in their own backyard, while also learning from other countries / other places / what other people are doing. This would get youth involved in monitoring under the guidance of experts, professors, teachers, while also connecting them globally through the theme.
- Queenie Tsui suggested it would be useful to establish 'sister school' relationships between schools in the U.S. and China, allowing both groups of students to use technology to improve language in both countries, and to help organize the curriculum in each place around water issues.

### **Everyone into the Pool**

The group also concluded their collaboration by proposing the creation of an educational website based on its understanding of what is a "Global Water Citizen" (as this focuses on personal behaviors).

The website would include a landing page that features a map that looks at global water basins, without attention to political boundaries. This map would explicitly highlight how people of all nations must cooperate based on shared geography, and draw attention to the need to get beyond "national thinking" when it comes to water issues.

The site would include separate themes for:

- Core science and key metrics
- Political discussions/debates
- Personal Behaviors
- Best Practices
- Global Frameworks

“Global frameworks” is clearly the most expansive version of the website. The group thought it especially important to understand that no group has any of the “final” or “correct” answers. Therefore, the site should include links to other credible sources, and it should be interactive. That is, young professionals from all around the world could post their responses to political questions, examples from their own communities, and various best practices.

A suggested outline of the site follows:

| <b>Core Science and Key Metrics</b>  | <b>Political Debates</b>  | <b>Personal Behaviors</b>   | <b>Best Practices</b>   | <b>Global Frameworks</b>  |
|--|---|---|---|---|
| <i>Local Metrics:</i><br>Rainfall,<br>Evaporation Rate,<br>Ground Water,<br>Surface Water,<br>Infiltration Rate  | <i>Question of Privatization</i><br>Water as a Human Right; Water Rights; | <i>Are you a global water citizen?</i><br>Can you answer these questions:<br>What watershed are you in? Where does your water come from?<br>Where does your effluent go? What actions can you take in your community? | Personal behaviors and information on indirect water impacts of consumption (e.g. meat) | Emerging international regulatory commissions for sea and freshwater                                      |
| <i>Global Climate Change:</i><br>Looking at indicators above on broad scale; importance of looking on a broad scale; grid size of 250 square kilometers at least; different global climatic models | Water “ownership” and preservation fundamentally a political question     |   | Authors as resources in each section / link (listed below)                              | Information on how, as citizens of specific countries, to attempt to influence global regulatory networks |
| Desertification in   | Civil society and   |   | Section of best   | Global map of   |

|                |  |  |  |  |
|----------------|--|--|--|--|
| global context | the role of public interest groups in responsible water management             |  | practices by governments and agencies, for policy; by individuals for specific behaviors; by businesses, for responsible business; by NGOs, for ways in which they contribute to public education or citizen organizing for clean water; | freshwater resources that deliberately DOES NOT include national boundaries, as a statement in thinking about our shared resources without boundaries of citizenship |
|                | Free data access as a best practice in political discussions relating to water |  |  | Free access to data; freedom of the press  |
|                |  |  |  | Clarity on upstream / downstream connections beyond political boundaries   |

*Sample Links*

**History of Water**, by Alice Atwater

**Small Scale Waste Water Treatment**, by John Todd

**Water Wars: Privatization, Pollution, and Profit**, by Vandana Shiva

**Transboundary Cooperation**, by Saddoff and Grey

**The Evolution of Markets for Water: Theory And Practice in Australia**, by Jeff Bennett

**Design for Water: Rainwater Harvesting, Stormwater Catchment, and Alternate Water Reuse**, by Heather Kincade-Levario

**The Biennial Report on Freshwater Resources**, by Peter Gleick

**Great Lakes Water Wars**, by Peter Annin

**Water: A Natural History**, by Alice Outwater

**Handbook of Water Use and Conservation: Homes, Landscapes, Industries, Businesses, Farms**, by Amy Vickers

[www.circleofblue.com](http://www.circleofblue.com)

[www.pacificinstitute.com](http://www.pacificinstitute.com)

[www.watersense.org](http://www.watersense.org)

[www.awwa.org](http://www.awwa.org)  
[www.a4we.org](http://www.a4we.org)  
[www.h2ouge.org](http://www.h2ouge.org)  
[www.rwsn.ch](http://www.rwsn.ch)  
[www.epa.gov](http://www.epa.gov)  
[www.appropedia.org](http://www.appropedia.org)

## **A Best Practices Education Project Proposal**

The common experience of the team is strongest in regards to educating younger people about the importance of water. Thus, our combined best practices will be implemented in the following project, the “*Best Practices Education Project*.” This project is not specific to China or to the U.S., but would be successful in both locations.

### **Background**

The over-consumption of water and pollution from non-point sources are major factors in the water problems of China and the United States. However, no matter how many infrastructure projects are built, the situation will not change until the local people change their behavior. To bring about lasting behavioral change, education is necessary—both in young people and in adults. Our proposed project will educate younger people in either China or the US about the necessary steps they must take to conserve water.

### **Project Scope**

The Best Practices Education Project will both protect water resources today, while empowering the younger generation to protect their environment for the future. It will be small at first, but after its pilot phase it can expand to reach a greater number of students.

The proposed project will reach out to 500 students from ages 12 to 16, in China and/or the United States. As the project expands, more communities can be incorporated. The project will provide environment education on water pollution and over-consumption and encourage students to find creative solutions to these threats. The project cost is that which will be financed by ...

Implementation will require direct collaboration with the local education department.

### **Stakeholders**

The following stakeholders have been identified:

*Choose and Add depending on project location*

- Parents (in all fields of employment)
- Students
- Local school district
- Local education organizations
- Local municipality
- Local religious, ethnic, sports, etc associations (whatever designates “community” in the project location, and the leaders of these communities)

- Businesses and Industry with a stake/impact in the local water source

## **Project Goal**

In one year, improve the understanding and awareness of water crises of pollution and over-consumption among local students.

## **Objectives**

- Raise awareness and knowledge among youth of the precious nature and biodiversity in their area
- Increase knowledge of measures that can be taken to decrease water pollution and over-consumption and promotion of changed behavior
- Increase capacity of students to plan their own development and management of water resources
- Increase comfort level of youth in outdoor settings to establish an improved connection between humans and nature

## **Outcomes/Indicators (of the Pilot Phase)**

- 500 students will benefit from the education program, increasing their awareness about environmental problems and their role in the solution
- Action Plan made to stop eventual pollution and over-consumption
- Public billboard with results, stories and photos from outdoor activities, in the physical and virtual world (e.g. Facebook, Twitter, etc)
- Increased incorporation of environmental lessons into students curriculum

## **Project Implementation**

The project will use a participatory approach by establishing an interest group consisting of local stakeholders (one per community involved). Through the help of this interest group, the project leaders (known as “Group Instructor”) will create an assessment of the “assets” of each community. What does each community uniquely provide, and how can these assets be tailored specifically to the project? (For example, does the community have a love of a certain sport that can be incorporated into the children’s learning? Do many members of the community work for a specific Industry that might be related?) Once the communities’ assets have been mapped, the interest groups will provide continued input into the project’s implementation.

### **Project Activities**

The following activities will address the Objectives of the project listed above:

#### **1. Outdoor Learning**

##### **a. Tree and other native plantings**

- i. Using local and native species from area, plan to plant a tree day

- ii. Contact a local nursery or organizations propagating native genotypes

*Cost:* Lunches, transportation to site, donated planting materials and trees

**b. Pond/River sampling**

- i. Children come to local pond/river and go “scooping” for animals
- ii. Children scoop flora and fauna into pans and view
- iii. Discussion in small groups

*Cost:* Pans and nets, transportation to site

**c. Scavenger hunt**

- i. Take a group of 10 to 20 children out to the wilderness and have them identify different types of habitats and animals, in the form of a big nature walk

*Cost:* Transportation to site

**d. Field Trip**

- i. Take students to local dump, recycling plant, sewage treatment plant (depending on what is available in the community) for children to understand where their waste goes and how waste is disposed

*Cost:* Transportation to site

**2. Environmental Science and Assessment**

**a. How much is used?**

- i. Have the kids do an activity of how much water is consumed in their house
- ii. Include the parents to help them. How much water is used to flush a toilet, brush teeth and other small things to get an average amount of water consumed by the household

**b) Water quality monitoring testing**

- i. Train teachers and volunteers
  - 1. PH, Dissolved oxygen, e-coli, nitrates, fecal coli form, biochemical oxygen demand, phosphorous
  - 2. Velocity, temperature, turbidity, total solids
- ii. Take students to a stream, pond or river and discussing the local habit
- iii. Perform above tests with kids; show them how it works and why it is important
- iv. Talk about the plant and animal life in the area (local biodiversity)

*Cost:* lunches for volunteers, teachers, students, t-shirts, School buses transportation, field trip fees / allowances (teachers may need money from school board)

### **3. Projects for Lifelong Environmental Learning**

#### **a. Scientific method**

- i. In 4-day sessions, at 4 hours a day, have students work in groups of 6 to 8
- ii. Topics cover water conservation, and can be anything from plant species, to animals, to bodies of water
- iii. Process
  - Ask a question
  - Do background research
  - Construct a hypothesis
  - Test the hypothesis by doing an experiment
  - Analyze data and draw conclusion
  - Communicate your results

This project will get the kids to know each other and research a topic that can be endemic to the region or a larger problem. After they get their topic, they get to make up a project- they can use computers (if available), outdoors tools and other methods to do an experiment. After they have found their conclusions, they will present this information (physically and virtually if possible), so they have a tangible outcome of what they learned, which they can be proud of. Findings will then be displayed in public spaces.

*Cost:* Educator cost, billboard supplies, computer time

#### **b. Personal Projects**

- i. Have children create personal projects to change their amount of consumption
- ii. Projects in their own homes
- iii. Projects in their communities

#### **c) Visiting Lecturer**

- i. Have leaders in organizations, interest groups, government, education,
- ii Visit the students and talk about their role in environmental protection This will encourage some students to pursue a career in environmental management.

### **c) Teacher Training Packages**

- i.** Identify mentors (teachers, coaches, youth group leaders, parents)
- ii** Provide the mentors with lesson materials to help them reinforce water conservation concepts and issues with youth involved in the rest of the program.

*Cost:* -Project WET (Watershed Education for Teachers) books (in-kind donation from Maryland Department of Natural Resources or other Project WET distributor).

CD with pictures and additional activities such as a “home water usage activity

### **Methodology**

The methods of implementation have been selected to ensure that both short-term and long term impacts of the project are realized and the project is sustainable. Participatory action planning with the interest groups is at the core of the implementation process for all the activities under the project.

*Core elements in the methodology:*

### **Participatory assessment of needs about water protection and management**

It is essential that the project involves members from the community in interest groups to identify their local water crises and their priorities for protection and preservation. The process will be driven by each interest group but assisted by project leaders.

### **Community Assets**

Once priorities are determined by the local community, the project leader will help the members create a map of their assets. Doing so will help the members identify how they can contribute to the project with what they have, strengthening the commitment to the project.

### **Case Stories of Change**

The target groups will be encouraged to become authors of their own change process by producing their own stories, painting, pictures, etc. These have much weight in influencing families and neighboring communities. Case stories of change will be documented and disseminated widely.

### **Community-Based Dialogue**

Interest groups need a platform to reflect on their efforts on an ongoing basis. Sharing lessons and case stories of change motivates further community involvement. The local education

administration will thus be able to assess the impact of the project, which will build a desire to incorporate more environmental programs into the education system.

Additionally, as the project expands, interest groups will begin a dialogue with each other, to learn from the benefits and downfalls of the project in each community.

## Conclusion

This 'blue' paper includes considerable information shared between the group (both among the delegations and between the delegations). All "*WH&T IF*" participants reported the exchange helped them to better understand the real conditions which exist in both nations. One of the American participants commented:

“The program was a spectacular experience that opened my eyes to China's complex government and environmental situation. Before traveling I had read a few books and articles that gave me a general understanding of how government influenced environmental management, however after traveling in China and engaging in lectures and discussions I gained a much deeper experiential view that will help guide my future research on water issues in any country I work in. I developed a critical ear for how information is presented and learned to analyze the speakers subjectively.”

Another noted, “What impressed me that we all have a common interest in the environment. Although we came from different professional backgrounds and have different motivations, we were put in a position to draw upon all of our expertise and came up with some great ideas in helping China with its water issues.”

It should be noted, however, that one of the concerns noted by several of the American and Chinese participants was the language barrier. Translators were useful, but it made it difficult to have meaningful conversations, especially those casual off-hours conversations which help to build relationships and help to clarify ideas. Despite this, one Chinese participant stated: “I didn't expect to have such a valuable chance to talk to my American counterparts in water management and experts in wetlands,” and an American noted, “I enjoyed collaborating with individuals from China and The United States. I also really enjoyed the diversity of perspectives we got from lectures ranging from provincial government, universities, non profits, and the ministry of water resources.”

Both the American and Chinese participants said the top results of the program were to “Understand Chinese/American approach to cleaning up its environment,” “Understand Chinese/American environmental/water issues,” and to “Develop collaborative partnerships with China/the U.S.”

Chinese and American participants were asked to rate their ability to do the following after participating in the *WH&T IF* program:

|  |             |             |             |                  |                  |
|--|-------------|-------------|-------------|------------------|------------------|
|  | <i>Poor</i> | <i>Fair</i> | <i>Good</i> | <i>Very Good</i> | <i>Excellent</i> |
|--|-------------|-------------|-------------|------------------|------------------|

|   |    |     |     |     |     |
|---|----|-----|-----|-----|-----|
| <b>Consider water resources in land development projects</b>                |    | 5%  | 56% | 39% |     |
| <b>Apply scientific advancements to improve water quality</b>               | 5% | 17% | 44% | 34% |     |
| <b>Engage the public in the discussion of environmental issues</b>          |    | 5%  | 33% | 31% | 31% |
| <b>Balance economic activity with the health of the environment</b>         |    | 18% | 44% | 33% | 5%  |
| <b>Develop and advocate for policies to fight environmental degradation</b> |    | 5%  | 53% | 29% | 13% |
| <b>Get students excited about environmental advocacy</b>                    |    | 41% | 29% | 12% | 18% |
| <b>Recruit and manage volunteers</b>  |    | 23% | 54% | 23% |     |
| <b>Work closely with people different from yourself</b>                     |    |     | 41% | 35% | 23% |

Finally, as a result of the experience, Chinese participants now held the following views of the United States:

|  | <i>Strongly Unfavorably</i> | <i>Moderately Unfavorably</i> | <i>Neutral</i> | <i>Moderately Favorably</i> | <i>Strongly Favorably</i> |
|--|-----------------------------|-------------------------------|----------------|-----------------------------|---------------------------|
| <b>Government of the U.S.</b>              |                             |                               | 50%            | 50%                         |                           |
| <b>American People</b>                     |                             |                               | 10%            | 50%                         | 40%                       |
| <b>Record of Environmental Stewardship</b> |                             |                               | 20%            | 50%                         | 30%                       |

|  |  |  |     |     |     |
|--|--|--|-----|-----|-----|
| <b>Potential for Addressing Environmental/Water Issues</b> |  |  | 10% | 60% | 30% |
|--|--|--|-----|-----|-----|

Conversely, the Americans said the following about China:

|  | <i>Strongly Unfavorably</i> | <i>Moderately Unfavorably</i> | <i>Neutral</i> | <i>Moderately Favorably</i> | <i>Strongly Favorably</i> |
|--|-----------------------------|-------------------------------|----------------|-----------------------------|---------------------------|
| <b>Government of China</b>                                 |                             | 75%                           | 25%            |                             |                           |
| <b>Chinese People</b>                                      |                             |                               |                | 37.5%                       | 62.5%                     |
| <b>Record of Environmental Stewardship</b>                 | 25%                         | 62.5%                         | 12.5%          |                             |                           |
| <b>Potential for Addressing Environmental/Water Issues</b> |                             | 14.3%                         |                | 71.4%                       | 14.3%                     |