

Final Report
to the Iowa Department of Natural Resources

Social Dynamics Assessment of Iowa Urban Stormwater Issues

Submitted by Mimi Wagner and Jan Thompson
December 5, 2006

Executive Summary

This project was conducted to assess stakeholder understanding, perceptions values and beliefs about urban stormwater in the NPDES Phase I and II communities in Iowa. We used focus groups and survey instruments targeted at three groups: residents, municipal officials, and developers. Their responses provide a benchmark for Iowans' understanding of stormwater dynamics at this time.

We conducted 10 focus group discussions which occurred in spring, 2006. These discussions included a total of about 50 participants, including homogeneous groups of residents (representatives of 6 communities) city officials (representatives of 8 communities), and developers (representing 1 community). The focus group discussions revealed that technical understanding of stormwater issues was low for residents and somewhat low for developers, that regional concerns existed with respect to the relationship between water quality and human health, that municipal officials' level of confidence about stormwater management was variable, that interpretations of "public participation" in stormwater education were quite different among municipalities, and that developers were very different from the other two groups of stakeholders in their attitudes and perceptions about stormwater.

Using information from the focus groups, three versions of a survey were prepared, one for each stakeholder group. The resident survey was delivered as a mail-return document. The municipal officials and developers were invited to participate in a web-based survey. We received survey responses from 450 residents, 96 municipal officials, and 18 developers.

Survey responses indicated trends in understanding similar to those expressed in focus groups. For residents, although some basic stormwater knowledge exists, there are several key ideas that are not well understood. Municipal and developer respondents indicated greater levels of technical understanding.

We developed a set of three main recommendations. First, education efforts should be simplified by focusing on ideas that will be easily understood and illustrated (e.g. the connection between stormwater dynamics and stream function and condition), where changes in behavior will result in tangible improvements mitigating against stormwater impacts. Second, education should target concepts that stakeholders are most uncertain about, such as whether stormwater is treated, whether there are problems with stormwater, and especially water quality versus water quantity issues. Third, we recommend delivering those messages via sources viewed as the most credible, and by targeting different venues for education for the three groups based on their reported preferences.

Objectives

This research assessed technical understanding, perceptions, values and beliefs regarding urban stormwater in the 43 Iowa communities and two universities included in the Phase I and II NPDES. Three groups of stakeholders were included in the assessment: general residents of MS4 communities, city officials in these communities and developers/homebuilders. The primary purpose of the project was to “benchmark” Iowans’ understanding of stormwater issues, and to identify both needs and methods of delivery for future education and outreach.

More specifically, this project addressed a set of goals for understanding among stakeholder groups concerning stormwater that was developed by the investigators in consultation with Iowa DNR staff during the early stages of this project. The following elements were included in this set:

- Understanding that urban stormwater causes impact to local streams, both in terms of the quantity reaching streams as well as water quality;
- Understanding the path of movement of stormwater from yards and streets to streams and lakes;
- Understanding the relationship between the quantity of stormwater runoff and stream stability/instability;
- Understanding that stormwater is not currently “treated” and that it may need to be treated before it enters Iowa streams and lakes;
- Developing a sense of responsibility for stormwater quantity and quality resulting from both individual properties as well as from combined municipal sources; and
- Understanding a variety of potential stormwater management practices.

This study was carried out with the intention of providing baseline information to support subsequent assessment that would allow measuring change following future education and outreach activities.

Methods

We utilized two forms of social assessment: initial focus group discussions and mail/internet questionnaires. Both forms of assessment allowed us to stratify our sample by stakeholder group and other attributes.

Focus Groups

We conducted ten focus group discussions between February – April, 2006. Each focus group included from 3-12 people, for a total of approximately 50 participants. All participants were guaranteed confidentiality. The following stakeholder groups were represented:

- City officials from eight MS4 communities including those with direct responsibility for NPDES permitting such as engineering, public works, water treatment, and planning and zoning offices;

- Residents from six communities, generally representing one or more neighborhood associations; and
- Central Iowa developers, including large-scale (entities involved in development throughout the state) and local (single-city) enterprises, as well as homebuilders and developers.

We identified several interesting themes throughout the focus groups as well as some differences based on region and stakeholder group:

The level of technical understanding demonstrated was low, with the exception of city staff. Participants often could abstractly define terms and concepts but were unable to apply them to specific situations such as their neighborhood or community. Examples include the differentiation between water quantity and water quality, as well as between surface water and ground water. The ability to apply concepts requires a higher level of understanding and experience with them than simply being able to define them.

Regional differences were noted in discussions of human health. We observed a strong concern in one region of the state, northwestern, for links between water quality and the high rate of cancer. E-coli bacteria levels were the only human health concern mentioned in other regions of state.

Phase I and Phase II city staff differentiated themselves in terms of confidence. Phase I city officials were much more confident about the future in terms of local ordinance development and compliance than Phase II communities. However Phase II communities did not seem to anticipate the struggles that the Phase I community described during implementation.

Developers were distinctly different from other groups in terms of their relationship to NPDES regulations and their beliefs about water quality. Because our focus group was conducted within a Phase I community, participants have experience with the regulations and knew developers who had been fined for violations. Their general tone reflected unease with the regulations. We also observed what appeared to be some disconnects in their understanding about the regulations, which federal and state agencies are involved, and how to design, install, and maintain practices to satisfy the regulations. The developer participants in our groups consistently reported their belief that 92% of water pollution in Iowa comes from agriculture and that, despite this fact, agricultural producers are not regulated in the same way developers are. When pressed to explain specifically what they meant by the 92% (of all pollutant sources, of all impaired waters...) they were unable to further explain.

We identified a range of beliefs about what constituted “public participation” with the NPDES regulations relative to water quality and stormwater. Some city officials suggested that appropriate participation was limited to passive activities such as observing stormwater management practice demonstrations the city constructs and picking up garbage in the streams. Other

communities saw this as constructing a citizens committee to more actively address water quality concerns, such as constructing demonstration projects and organizing educational neighborhood meetings.

Various beliefs were identified concerning the use of direct mailings for stormwater education. All participating communities reported using this method of public education, particularly in utility bills. However, most reported little confidence the mailings were have a large-scale education impact in their communities. The few cities with beliefs that the mailings were effective could provide no evaluation criteria or evidence to support their beliefs.

Survey

We developed three separate survey instruments, one for each stakeholder group, based on results of the focus groups. Survey questions were constructed with closed-ended questions so that responses could easily be computer coded and analyzed, however numerous opportunities were offered for “other” written responses. Written responses were organized and reported separately. The resident and city official versions of the survey were “field tested” with the last focus groups, to determine length of time required to complete the survey and review the answerability of items on the questionnaire.

Resident surveys were mailed to 1000 residents in Iowa MS4 communities. The number of surveys mailed to each of the 43 communities and two universities was proportional to the community’s population size. We received a statistically representative response of 450 surveys. The sample was comprised of 63 percent men and 36 percent women, while the range included 19 -92 years.

All city officials with direct responsibility for stormwater permitting in the 42 MS4 communities and the two state universities were contacted by email and invited to participate in the survey through a secure web connection and database in the ISU College of Design. This sample is referred to as the “municipal” hereafter in this report. We mailed paper versions of the surveys in several municipalities that did not provide internet access or email accounts to their staff. We received a total of 96 responses, a 50 percent return rate. Responses were distributed among communities of >100,001 population (27% of responses), between 10,000 and 100,000 population (39% of responses), and communities < 10,000 population. Phase I communities had a 66% return rate while Phase II communities had a 44% response rate. The municipal sample included 47 percent management staff, 43 percent assistant or professional staff, and 10 percent technical staff.

Similar to city officials, Iowa developers and/or homebuilders were invited to participate in an electronic version of the survey by email. Chuck Thomas, former lobbyist for the Iowa Homebuilders Association and acting independently, was instrumental in providing us with access to 152 developer email contacts from two geographic regions, and from these we received 18 survey responses. Thirty-three percent of responses represented the Quad Cities region of eastern Iowa while the remaining sixty-seven percent represented

the Des Moines metro region. The developer sample was entirely male with 79% indicating direct experience working in a Phase I community and NPDES permitting. . Forty-four percent consider themselves developers/builders, 25% only developers, and 31% only builders. The sample indicated they develop/build/sell an average of 207 homes annually; quantity per respondent ranged from 4 to 1500 homes annually.

Results

Survey results are organized into four categories based on the DNR’s ten-year goals for understanding: contextual stormwater issues, urban stormwater pollution and impacts, stormwater management practices, and reaching people about urban stormwater. Results are presented below, within these four categories, as the percent of respondents within each group that chose the indicated response for the specific survey question.

Contextual stormwater issues

Importance of streams

The relative importance of streams to someone often impacts the level of concern or interest they may have about water quality in the stream and stream condition. We asked participants to rate the importance of streams to them and to others in their communities. The majority of respondents (69%, 81%, and 56%, respectively for residents, municipal, and developers) indicated that streams were very important to them, although most respondents also indicated that streams were only somewhat important to other residents (54%, 64%, and 47%, respectively) or that other residents simply didn’t care (17% for residents and municipal, 12% for developers) (Table 1).

Table 1. Respondents’ rating of the importance of streams to themselves and others in their communities. Numbers represent the proportion of participants that selected respective categories.

Rating	Residents		Municipal		Developers	
	To you	To others	To you	To others	To you	To others
Very important	69%	29%	81%	19%	56%	41%
Somewhat important	28%	54%	19%	64%	44%	47%
Unimportant/ don’t care	3%	17%	0%	17%	0%	12%

Watershed definition

We noted a lack of complete understanding of the term “watershed” during focus group discussions. Participants were able to conceptually describe a relationship between land and drainage, but were often unable to apply the concept to a specific site such as the land where they live. We constructed survey responses to coordinate with the different types of responses during focus group discussions and asked residents and developers to choose

a best description of the meaning of the word. Municipal participants were excluded because focus group results indicated a compatible understanding with the meaning used by DNR.

The strongest misinterpretation of the term represented on the survey, “water that is shed from my property”, was chosen by relatively few respondents (Table 2). The choice conceptually representing watershed elements but technically inaccurate, “an area... water moves downhill to”, was chosen by some residents (17%) and a majority of developers (83%). A significant group of residents (19%) indicated that they were unsure of a good description for a watershed.

Table 2. Respondents’ choice of description for the concept “watershed”.

Statement defining a watershed	Residents	Developers
The water that is “shed” from my property or neighborhood	6%	11%
An area with high points and low points that the water moves downhill to	17%	83%
An area of land that drains to a specific point	58%	6%
I’m not sure	19%	0%

Perceptions of local water quality

Resident, municipal and developer participants were asked to rate existing water quality in their communities, with respect to water in streams and lakes, as well as drinking water. The majority of respondents (72%, 81% and 88% for the three groups, respectively) indicated that stream water was between somewhat acceptable and excellent quality at present (Table 3). Only 12% of residents and 17% of municipal and developers rated stream water quality as unacceptable. As benchmarks, the three groups rated lake water quality at about the same level as stream water, although drinking water quality was rated as more acceptable by all three groups.

Table 3. Respondents’ ratings of water quality in streams, lakes and drinking water.

Rating	Residents			Municipal			Developers		
	Streams	Lakes	Drinking water	Streams	Lakes	Drinking water	Streams	Lakes	Drinking water
Excellent	2%	2%	27%	4%	0%	67%	6%	11%	33%
Acceptable	36%	30%	58%	45%	58%	29%	67%	44%	56%
Somewhat acceptable	34%	33%	9%	32%	22%	3%	6%	22%	6%
Unacceptable	12%	14%	3%	17%	13%	0%	17%	17%	0%
Don’t know	16%	21%	2%	2%	7%	0%	6%	6%	6%

Origin of surface water pollutants

Based on developer sensitivity about the source of water pollutants in Iowa we observed during focus group discussions, we questioned them specifically about their beliefs regarding sources of impairment of Iowa streams. Developers overwhelmingly indicated that agricultural land uses were responsible for the majority of pollution (Table 4). Urban, industrial, and rural non-agricultural land uses were identified as less significant. Developers did not offer any “other” sources of impairment.

Table 4. Developers’ perceptions of sources of pollutants in Iowa streams.

Land Use	Mean percent	Response range
Urban	19%	1-60%
Agricultural	60%	20-95%
Industrial	18%	3-40%
Rural non-agricultural	3%	0-10%

Urban stormwater pollution and impacts

Definitions of “stormwater”

The term “stormwater” is commonly used when discussing NPDES issues with municipalities. We used an open-ended question directed toward municipal officials to clarify how they conceptualize the meaning of the term stormwater. All responses, except two, included elements consistent with DNR’s working definition of “stormwater”. One of the most interesting definitions stated:

“The word "stormwater" always elicits a strong visual component. I immediately picture rainwater and the moment of contact with a surface - whether that surface is a leaf, grass, a rusting gutter, an oily parking lot, a body of water, or bare soil. Stormwater, to me, is water that enters my environment and is changed upon its contact with any surface it meets. It erodes surfaces, it is slowed by vegetation, it is captured in a pond, it pushes debris along. Stormwater is a dynamic entity” (Respondent from a community of <10,000 population).

We analyzed responses and identified six main themes (Table 5). There was no statistical relationship between responses and respondent’s community size.

Table 5. Themes in municipal officials’ definitions of stormwater.

Themes	Percent of respondents that included this theme
Precipitation water as object—definition includes description of forms of precipitation	25%
Precipitation water including description of receiving water body	24%
Includes both runoff and infiltration water	6%
Runoff as product or result of stormwater	26%
Runoff including description of pollutants included and/or source of runoff (land use type)	14%
Engineered or control system	5%

Perceptions of local stormwater problems

We asked all three groups about problems with stormwater in their communities. A number of residents (33%) and developers (29%) indicated that there were problems, although a significant proportion of residents (43%) indicated that they didn’t know if problems existed (Table 6). Municipal participants were asked if there were problems with stormwater *quality* (59% indicated yes) and stormwater *quantity* (50% indicated yes) in their communities. However, all three groups (86%, 94%, and 88%, respectively) agreed that runoff from city streets was likely to contain pollutants.

Table 6. Perceptions of problems with local stormwater.

Is there a problem with stormwater in your community?	Residents	Municipal	Developers
Yes	34%	NA	29%
I don’t know	42%	NA	12%
Yes, with respect to water quality	NA	59%	NA
Yes, with respect to water quantity	NA	51%	NA
Runoff from city streets likely contains pollutants	86%	94%	88%

Relationship between stormwater runoff and stream condition

Because the quantity and quality of stormwater entering streams is directly related to the ensuing water condition and function of those streams, we inquired about this relationship directly. All three groups were asked to choose the description that best captured the relationship between stormwater runoff and stream condition in their communities. Most respondents indicated stormwater runoff affected stream and bank conditions and water quality (69%, 86% and 72%, respectively) (Table 7). Some respondents (14% of residents, 9% of municipal, and 28% of developers) indicated that there “may be” a relationship.

About 1% of residents and 2% of municipal respondents indicated there is no relationship between the two. A significant proportion of residents (17%) and one municipal respondent indicated they were not sure whether there was a relationship between stormwater and stream condition. Municipal respondents choosing these two options were in communities of <10,000 population and represented non-professional staff.

Table 7. Respondents’ characterization of stormwater runoff and stream condition.

Response	Residents	Municipal	Developers
They are not related	1%	2%	0%
They may be related	14%	9%	28%
Stormwater affects stream and bank conditions	69%	86%	72%
Not sure	17%	2%	0%

Understanding of stormwater movement

Residents and developers also were asked to choose the best description for the fate of precipitation in their neighborhoods. The majority of both groups (62% of residents, 61% of developers) agreed with the statement that “most water flows into a sewer system” (Table 8). However, some residents (15%) indicated that “almost all of the water soaks into the ground”, and significant proportions of both groups (18% and 39%, respectively) indicated that “most water flows into a ditch”. About 6% of residents indicated they didn’t know.

Table 8. Respondents’ opinions about what happens to water during a heavy rainfall event.

Response	Residents	Developers
Most soaks into the ground	15%	0%
Some soaks in, most goes to a ditch	18%	39%
Some soaks in, most goes to a sewer	62%	61%
I don’t know	6%	0%

Beliefs about stormwater treatment

We asked residents and developers if they believed stormwater was treated before being discharged to local streams (during focus group discussions we observed municipal participants already understood that stormwater was not treated). A significant proportion of residents indicated either “yes” (9%) or “I don’t know” (57%). Most developers (78%) indicated that stormwater is not treated, although 6% indicated that it was treated, and 17% reported that they didn’t know (Table 9).

Table 9. Respondents' opinions about whether stormwater is treated before being discharged.

Response	Residents	Developers
Yes	9%	6%
No	34%	78%
I don't know	57%	17%

Stormwater responsibility

All three groups also were queried about responsibility for solving stormwater problems in their communities, and asked to “check all that apply”. When asked who should be responsible for making changes where problems existed, the bulk of respondents indicated city officials should do so (68%, 87%, and 61%, respectively) (Table 10). The three groups also indicated that property owners should bear some responsibility in this regard (32%, 84%, and 50%).

Table 10. Respondents' opinions about responsibility for correcting stormwater problems.

Response	Residents	Municipal	Developers
City officials in my community	68%	87%	61%
State officials in Des Moines	34%	52%	28%
Federal agencies	26%	45%	17%
Property owners where problem occurs	32%	84%	50%
Farm owners and managers	24%	68%	33%
Residents in general	32%	71%	22%

Residents also were asked directly about their personal role and responsibility with respect to stormwater in urban areas. Residents indicated a high level of responsibility for stormwater quality (65%), although they reported less personal responsibility for stormwater quantity parameters (20-28%) (Table 11).

Table 11. Residents' beliefs of personal responsibility for stormwater.

Statement	Residents agreeing
I am responsible for the amount of stormwater leaving my property	28%
I am responsible for keeping pollutants out of stormwater leaving my property	65%
I do or should pay a utility fee for city officials to manage stormwater	46%
Managing stormwater is not my responsibility	21%

Stormwater management practices

Familiarity with stormwater practices and their effectiveness

We provided a list of selected stormwater management practices and asked participants to rate them according to their familiarity with the practice and the likelihood that the practice would be visually acceptable in their community. Overall, municipal respondents reported the greatest familiarity with the range of practices listed (56% to 92% of respondents) (Table 12). Residents reported the least familiarity with many of these practices (ranging from 9% to 60%, but generally lower than the other two groups).

Developers were most familiar with practices handling water from multiple lots, such as detention ponds (83%) and constructed wetlands (94%), rather than those impacting individual lots, such as rain gardens. Visual acceptability ratings were low for all three groups with respect to the least familiar practices such as surface sand filters and gravity separators.

Table 12. Respondents' ratings of stormwater management practices.

Stormwater practice	Residents		Municipal		Developers	
	Familiar	*Visually Acceptable	Familiar	*Visually Acceptable	Familiar	*Visually Acceptable
Rain gardens	20%	58%	83%	74%	56%	10%
Detention ponds	52%	35%	92%	47%	83%	47%
Constructed wetlands	56%	53%	92%	67%	94%	59%
Sand filters	21%	18%	61%	36%	39%	29%
Grass channels	34%	56%	79%	72%	72%	77%
Bioswales	9%	32%	71%	69%	61%	73%
Pervious pavers	14%	41%	89%	65%	67%	67%
Gravity separators	11%	15%	56%	40%	22%	25%

* percentage reported includes only those respondents indicating familiarity with the practice, rather than percentage of the total sample

In other studies, water quality monitoring results for installed urban stormwater management practices indicate variability in effectiveness with respect to both water quality and water quantity. We asked participants to rate the effectiveness of the above practices for enhancing water quality and reducing stormwater flows reaching streams. In general, municipal officials appear to be most confident about these practices while residents appear to be least certain about the effectiveness of these practices (Table 13). There also appear to be some “disconnects” in technical understanding of the function of these practices – for example, a number of municipal officials and developers indicated that sand filters would decrease the amount of stormwater reaching streams, in addition to removing pollutants.

Table 13. Respondents' beliefs about the effectiveness of stormwater management practices for reducing pollutant loading and stormwater quantity reaching streams.

Stormwater practice	Residents		Municipal		Developers	
	Reduces pollutants*	Reduces amount	Reduces pollutants	Reduces amount	Reduces pollutants	Reduces amount
Rain gardens	36%	46%	76%	77%	60%	70%
Detention ponds	22%	50%	56%	57%	47%	73%
Constructed wetlands	36%	46%	75%	71%	53%	59%
Sand filters	51%	21%	66%	34%	71%	43%
Grass channels	47%	46%	76%	61%	61%	69%
Bioswales	32%	37%	81%	71%	73%	64%
Pervious pavers	18%	43%	45%	69%	42%	92%
Gravity separators	41%	20%	68%	26%	50%	0

* percentage reported includes only those respondents indicating familiarity with the practice, rather than percentage of the total sample

In a separate survey item, municipal participants were more directly asked whether the above features, implemented in urban areas, would be effective in reducing the level of pollutants in stormwater and slowing the rate of runoff. An overwhelming majority of municipal respondents (98%) indicated that they thought these features would be effective.

Importance of open, undeveloped areas

We also asked all three groups about the importance of open, undeveloped areas in their community. The majority of residents (78%) and municipal (85%) respondents indicated that these areas were very important, but only 41% of developers reported that belief (Table 14). As a follow-up question, we also asked respondents to indicate *why* these areas were important – recreation (84%, 91% and 61% of residents, municipal, and developer respondents, respectively), slowing or reducing the movement of stormwater (58%, 85%, and 67%), and improving the quality of stormwater (50%, 87%, and 50%) were rated as relatively important functions of open space by all three groups.

Table 14. Respondents' rating of the importance of open areas.

Rating	Residents	Municipal	Developers
Very important	78%	85%	41%
Somewhat important	19%	15%	47%
Interesting to look at	53%	62%	33%
Used for recreation	84%	91%	61%
Important to have places like this	80%	84%	44%
These areas slow and reduce amount of stormwater reaching streams and lakes	58%	85%	67%
These areas improve the quality of stormwater	50%	87%	50%
Not important	3%	0%	12%

Reaching people about urban stormwater

Current sources of water quality information

We queried respondents about sources of information about water quality – the sources of information they receive and their beliefs about the credibility of those sources. All three groups were asked if they received information from city offices, the DNR (printed or website), newspapers, and ISU extension. A greater proportion of municipal respondents reported receiving information from more of these sources than the other two groups (Table 15). Among the items that all three groups rated, printed information from the DNR was deemed the most credible (from 49% to 88%), and information from newspapers as the least credible (from 11% to 28%). Many fewer residents (10%) and developers (39%) reported receiving information from the DNR website than did municipal respondents (72%).

One or two of the groups also were asked about several other potential sources of information. Of note, 36% of resident respondents reported receiving information from television, although only 23% indicated that it was credible (also Table 14). Many municipal respondents reported receiving information from the NRCS (47% received, 58% reported it was credible), SWCDs (54% received, 63% credible), the Iowa Geologic Survey (25% received, 43% credible), and the IAMU (62% received and 65% credible). Developers also reported receiving information (28%) from the IAMU, although many fewer of them rated this information as credible (6%). Developers also reported receiving information from the IHBA (67% received such information, 56% rated it as credible), and from the EPA website (50% received, 44% credible).

Table 15. Respondents’ reported sources of information about stormwater and their rating of the credibility of information received.

Rating	Residents		Municipal		Developers	
	Receive	Credible	Receive	Credible	Receive	Credible
City offices	34%	34%	79%	67%	61%	56%
DNR printed	30%	48%	86%	88%	72%	61%
DNR website	12%	35%	72%	76%	39%	44%
Newspaper	61%	30%	50%	15%	50%	11%
ISU Extension	19%	35%	32%	47%	22%	33%
Local government	50%	41%	NA		44%	39%
Local TV	36%	23%	NA			
Radio	32%	18%	NA			
SWCS	NA		54%	63%	NA	
IAMU	NA		62%	65%	28%	6%
IHBA	NA		NA		67%	56%

Desired future types of urban stormwater communication

Finally, we asked residents and developers about the kinds of activities they would be likely to participate in to get more information about stormwater. Residents indicated that they would read flyers (60%) and local newspapers (69%), watch TV programs (53%), and read articles in their neighborhood associations' newsletters (26%) (Table 16). Developers indicated a strong preference for workshops with city staff (72%), but also indicated willingness to participate in workshops with state agencies (56%), reading local newspapers (33%) and reading materials on agency websites (33%). About 10% of residents and 6% of developers indicated that they would not participate in any activities to learn more about stormwater.

Table 16. Activities respondents would participate in to get more information about stormwater.

Activity	Residents	Developers
Workshops	8%	NA
Workshop with city staff	NA	72%
Workshop with state agency	NA	56%
Workshop with federal agency	NA	33%
Reading flyers	60%	NA
Reading local newspapers	69%	33%
Watching TV programs	53%	NA
Video from state agency	NA	11%
Articles in neighborhood association newsletter	26%	NA
Materials from children's school	16%	NA
Agency websites	NA	33%
City website	20%	NA
Would not participate in any activities	11%	6%

Discussion and Recommendations

Focus group discussions and survey results provide a snapshot of stakeholder perceptions as they relate to stormwater and water quality in Iowa in 2006. For residents, the data indicate that although some basic stormwater knowledge exists there is much room for enhancing understanding of basic stormwater principles. Municipal and developer respondents, as we expected, demonstrated higher levels of understanding, although each group brought their own set of biases to the issue. Based on the Iowa DNR's list of ten-year goals for understanding and our interpretation of the results, we recommend the following to guide future education efforts relative to stormwater issues.

Contextual stormwater issues

Resident, municipal, and developer respondents expressed strong values related to the importance of streams in their communities, suggesting they will be interested in learning more about how to improve the stream condition and function. However, much confusion exists with respect to the term “watershed” among residents and developers. Currently this term is used to garner support for the protection of a stream, and its water quality, through changes in behavior that could be helpful in decreasing pollutant loads entering the stream. While the majority of respondents in both groups recognize a general connection with runoff and landform, they are unable to apply the concept of “watershed” as it relates to water quality.

These results may point toward an alternative strategy for education, moving the focus of education and awareness efforts to an emphasis on stream condition and function, rather than focusing on the more abstract and misunderstood concept of “watershed”. A focus on stream condition would allow stakeholders to directly observe changes in streams and water related to different activities undertaken to improve them. While not all the factors impacting water quality are visually observable in streams, many are. Educational materials and presentations could continue to directly relate to stormwater runoff (and so, indirectly, the watershed) although we would suggest placing more emphasis on education about what an urban stream in stable condition would look like and how it would behave.

Urban stormwater pollution and impacts

Although a large majority of respondents indicated that runoff from city streets likely contains pollutants, only a third of the resident and developer participants indicated that there was definitely a problem with stormwater in their community, and almost half of resident respondents in particular were unsure whether there were problems or not. Two-thirds of residents also reported that they didn’t know whether stormwater is treated before being discharged. In addition, there was uncertainty expressed by both residents and developers about the relationship between stormwater runoff and stream condition.

These results point toward the need for ongoing education efforts for both residents and developers emphasizing the importance of stormwater *quality*. Such efforts should be directed to create awareness of pollutants in urban environments, emphasize that stormwater is not treated, and assist stakeholders in developing sound technical understandings of the pathways by which pollutants in stormwater may move to streams.

Interestingly, residents appeared more willing to assume responsibility for stormwater *quality* than for stormwater *quantity* with respect to their own property. In general, residents attributed most of the responsibility for addressing stormwater problems to city staff. Focused education efforts should also be directed at identifying stormwater *quantity* problems, distinguishing them very clearly from water quality issues, and helping stakeholders understand what causes them. In addition, residents should be encouraged to take responsibility for the quantity of stormwater generated by their properties. Both quality and quantity emphases could be incorporated into an approach focused on the condition and function of the streams themselves, again capitalizing on the value held for streams, as detailed in the previous section..

Stormwater management practices

Municipal officials reported great familiarity with stormwater BMPs as well as recognition of the functional role of open spaces with respect to stormwater mitigation. Residents and developers, however, were not as familiar with the BMPs nor did they appreciate the value of open spaces for stormwater management.

Municipal officials should be encouraged to work with their city staff to implement BMPs on city properties (to “walk the walk”), both to address stormwater management directly on those properties as well as to serve as demonstration sites for both residents and developers. Additional education efforts tailored for each of the latter two audiences, with detailed information about practices appropriate to their respective situations (e.g. raingardens for residents, bioswales for developers) are likely to produce tangible results in terms of both awareness and implementation. In all cases, education about the functional value of open spaces seems warranted.

Reaching people about urban stormwater

Respondents’ rankings of how they receive information and what they perceive as credible information offer direct guidance for delivery mechanisms for the messages identified in previous sections. Based on respondents’ ratings, the most effective methods of delivery are likely to be different among the three stakeholder groups we surveyed.

Residents appear interested and willing to engage in relatively passive activities tied to things they already do (e.g. reading flyers from local government offices, the newspaper, reading neighborhood association newsletter items, or watching programs on TV) to learn more about stormwater. Residents’ low ratings of credibility for information generally provided by newspapers coupled with very high ratings of credibility for IDNR sources indicate that an effective approach might be for IDNR staff to prepare detailed news releases under a DNR byline for inclusion in papers circulated in Phase I and Phase II communities. These should be tailored to convey the messages specific to residents identified in previous sections of this report.

Municipal officials are presently the best-educated stakeholder group with respect to stormwater among the three we surveyed. Respondents indicated that they regard as credible information that they receive from a number of different sources. This group seems more likely than the other two groups to take advantage of web-based information and extension sources, as well as the IAMU. A new focus in materials provided to them on the themes described in previous sections may help municipal officials gain a more nuanced understanding of stormwater dynamics and provide ideas for their own information and education programs (as well as tools for delivery) for local audiences.

The developers that responded to the survey indicated a strong preference for more direct engagement in the form of workshops with local city staff, followed by workshops with

state agencies as a means of stormwater education. Developers' ratings of credibility show a strong level of trust for IDNR and IHBA sources. Avenues to deliver information to developers could include workshops co-sponsored by IDNR and IHBA, likely with materials prepared by IDNR personnel. Developers expressed a high level of mistrust for information from the IAMU, and although results described above indicate that education efforts by that organization will be very effective with municipal officials, interactions between the IAMU and developers are less likely to have positive outcomes.

In summary, the results of the survey provide a benchmark for Iowans' perceptions and understanding of stormwater in Phase I and Phase II communities throughout the state at this time. Our recommendation is that education efforts should be targeted at concepts about which stakeholders are most uncertain, ideas that are more easily understood, and where changes in behavior will result in tangible improvements in stormwater dynamics. This could be accomplished by shifting the focus from a watershed approach to an approach that emphasizes stream function and condition, by creating messages that address both stormwater quality and quantity issues and clearly distinguish the two, delivering those messages via sources viewed as the most credible, and by targeting different venues for education for the three groups based on their reported preferences.