

Members

Rep. David Cheatham, Chair
Rep. Steven Stemler
Rep. Joseph Pearson
Rep. William Friend
Rep. Jack Lutz
Rep. Richard Dodge
Sen. Greg Walker, Vice-Chair
Sen. Randall Head
Sen. Edward Charbonneau
Sen. Robert Deig
Sen. James Lewis
Sen. Richard Young



LSA Staff:

Bernadette Bartlett, Fiscal Analyst for the
Committee
Irma Reinumagi, Attorney for the Committee

Authority: IC 2-5-25

WATER RESOURCES STUDY COMMITTEE

Legislative Services Agency
200 West Washington Street, Suite 301
Indianapolis, Indiana 46204-2789
Tel: (317) 233-0696 Fax: (317) 232-2554

MEETING MINUTES¹

Meeting Date: September 30, 2010
Meeting Time: 1:00 p.m.
Meeting Place: State House, 200 W. Washington St., House Chambers
Meeting City: Indianapolis, Indiana
Meeting Number: 2

Members Present: Rep. David Cheatham, Chair; Rep. Steven Stemler; Rep. Joseph Pearson; Rep. William Friend; Rep. Jack Lutz; Rep. Richard Dodge; Sen. Greg Walker, Vice-Chair; Sen. James Lewis; Sen. Richard Young.

Members Absent: Sen. Randall Head; Sen. Edward Charbonneau; Sen. Robert Deig.

Call to Order. Rep. David Cheatham (Chair) called the meeting to order at 1:10 p.m.

Bob and Sarah Clapp explained the difficulties they have had trying to get help from various governmental agencies at the state and local level with a flooding problem caused by a neighbor. The problem began in 1999 when a neighbor began filling in a pond with junk and debris. This action caused water from rains and its run-off to flood the Clapp's driveway. Subsequent fillings and the addition of logs along the property line caused the water to come up to the Clapp's house. Because their home is within two miles of the city, they were told by county officials to take the matter to the city officials. The city declined to intervene. The Indiana Department of Environmental Affairs, which has jurisdiction over water quality issues, has also declined to help. The Clapps stated that they would like to have a solution where clear authority is given to an official or governmental agency to help in these matters.

Representative Milo Smith stated that he has had multiple constituents who have faced similar situations as the Clapps have faced. Problems can come from plans that have been reviewed and

¹ These minutes, exhibits, and other materials referenced in the minutes can be viewed electronically at <http://www.in.gov/legislative>. Hard copies can be obtained in the Legislative Information Center in Room 230 of the State House in Indianapolis, Indiana. Requests for hard copies may be mailed to the Legislative Information Center, Legislative Services Agency, West Washington Street, Indianapolis, IN 46204-2789. A fee of \$0.15 per page and mailing costs will be charged for hard copies.

approved. He would like to see issues from unintended consequences to go back to the approving authority and give the authority the responsibility to devise an appropriate solution. There is a need to have a person with the authority to take corrective actions. He would like to have that authority given to the county surveyor.

Rhonda Cook and Jodi Wood, Association of Cities and Towns, stated that people face drainage issues. There are many causes for those problems. They had concerns with creating a solution that creates more government. There is also an expense to the taxpayers if the government is given the role of settling storm water nuisance issues. Many drainage issues require doing a detailed search of the property records to look at all the easements that may apply. Fees assessed on the parties may not cover the investigation costs, or the person who is found to be responsible may not be a party to the complaint. The state's cities and towns cannot be guarantors that building developments will not cause unforeseen drainage problems. In the last legislative session, two bills were introduced to address drainage issues. Ms. Cook distributed a letter to Senator Kenley from the Hamilton County Commissioners that opposed these bills. (Exhibit #1)

Rick Wajda, Indiana Home Builders Association, stated that Rep. Smith's original bill (HB 1201-2010) would have abrogated the common law rule of the Common Enemy Doctrine. Their association will be monitoring any future bills to make sure that homeowner's rights are not adversely affected.

Bob Kraft, Indiana Farm Bureau (IFB), stated that drainage issues are a long-standing problem in the state, and there are no easy solutions. The IFB has been working with other groups to try to develop solutions to drainage issues. The legislation introduced last session would have made the county surveyor and the county drainage board the final mediator in drainage disputes. The state's Common Enemy Doctrine does not need to be changed. There is a need, however, to have someone who property owners can go to who can offer a final solution or at least who can provide good advice. Whoever is given this authority should be allowed to use it to resolve disputes among all the affected parties, including governmental entities. Mr. Kraft distributed a brochure entitled "Legal Considerations for Solving Drainage Problems." (Exhibit # 2)

Mark Thornburg, IFB, clarified that there was a distinction in the Common Enemy Doctrine between diffused surface water and channelized water. Channelized water has a bed or bank and accelerates the flow of the water. He also noted that the county drainage board's current authority is over regulated drains and removal of obstructions from mutual drains.

Art K. Umble, Ph.D., P.E., Greeley and Hansen LLC, delivered a slide presentation entitled "What is in the Future for Our World's Water?" His presentation detailed the quality of the freshwater supply and the gaps in global demand. (Exhibit #3) The presentation was based on findings in the 2030 Water Resources Group report. The report found that in the next twenty years the world's demand for water will double. The demand in North America will increase 43% over the next two decades. Dr. Umble talked about the embedded cost of water in the cost of the production of goods, services, and agricultural products. The concept of "virtual water" refers to the cost (or use) of local water in the preparation of goods for export. Approximately 12,000 gallons of water are needed to produce one pound of beef. Water will have more value in the future. He summarized by making the following points:

- The global water crises is upon us now and is growing.
- Business as usual water management is not sustainable.

- There is enough water for all; however, the issue is making the trade-off choices that seek self-sufficiency.
- The United States is not "water scarce," but the challenge will be managing our "virtual water" resource.
- Virtual water is a key to global water sustainability.
- The United States is the world's leading exporter of virtual water.
- Exporting exerts an indirect pressure on water resources in the United States.
- Virtual water is redefining the price of water.
- Virtual water beckons technological innovation.

Ron McAhrn, Deputy Director, Department of Natural Resources, presented a status report by the Water Resources Task Force. (Exhibit #4) The Task Force was created under IC 14-25-16 and met for the first time on August 27, 2010. The report contains the names of the members and minutes from their first meeting.

Lynn Dennis, The Nature Conservancy, provided a follow-up to the presentation made by Jennifer Boyle at the Committee's August 26th meeting. A summary of Ms. Dennis's remarks were distributed to Committee members. (Exhibits #5 & #6) She proposed that Indiana create a new Sustainable Resources Funding Advisory Committee similar to what Iowa did in 2006. The advisory committee would be charged with the following responsibilities:

- Collect data regarding natural resource protection programs, funding, and funding mechanisms in other states.
- Collect programmatic and funding data on current natural resource protection programs in Indiana.
- Explore options for creating a conservation funding mechanism.
- Determine the natural resource needs in Indiana and what would be accomplished if the conservation funding initiative were implemented.
- Complete an analysis of Indiana citizens' willingness to pay for such an initiative.

The proposed advisory committee would begin on July 1, 2011, and sunset May 1, 2013.

Glen Pratt, Sierra Club, stated the Sierra Club has worked with groups to develop drought plans. Dr. Umble's presentation is more evidence of the pressing need to look into the water resource issue.

Next Meeting Date. The Chair announced that the next meeting of the Committee would take place on October 28th at 1:00 p.m.

Adjournment. The Chair adjourned the meeting at 3:10 p.m.



County of Hamilton
State of Indiana

Exhibit 1
Water Resources Study Committee
September 30, 2010

Christine Altman
Commissioner District 1
Steven C. Dillinger
Commissioner District 2
Steven A. Holt
Commissioner District 3

January 22, 2010

Senator Luke Kenley
PO Box 809
Noblesville, IN 46061

Re: Senate Bill 282 and House Bill 1201
(Expansion of Powers of County Drainage Board)

Dear Senator Kenley:

This letter is written to voice the strong opposition of the Hamilton County Commissioners, to the above bills ("the Bills"). These Bills are identical and create new duties of the County Surveyor and the County Drainage Board to investigate and decide neighbor's disputes concerning storm water discharges from artificially constructed water courses. Our opposition to the above Bills is based upon the following:

1. The Bills create a totally new opportunity for government to intrude into private disputes between neighboring landowners.
2. The Bills will impose additional duties, time demands, and increased costs upon local government at a time when the General Assembly has determined that local government should reduce costs and services.
3. The Bills create a remedy that already exists in common law because private citizens presently have the right to use the Court system to seek judicial relief against adjoining landowners who collect and discharge storm water upon their neighbors.

The Bills amended Indiana Code 36-9-27.4 which currently provides for the County Surveyor and the Drainage Board to investigate and act as a court to resolve neighbor disputes concerning "natural surface water courses". In the past several years, the Hamilton County Drainage Board has decided two cases under the existing statute. Both took a substantial amount of time of Surveyor office employees and the Board; both appeared to be extensions of ongoing neighbor disputes; and one resulted in the decision

being appealed to court, resulting in further legal expenses and staff time of the Drainage Board to prepare and participate in a two day trial. Based on our experience, we can assure you the Legislative Service Agency's conclusion that, "The impact on local administrative expenses should be minimal," is incorrect.

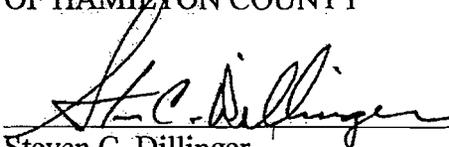
Finally, the proposed Bills create a remedy that already exists in common law. It has long been the law in Indiana that a landowner may not collect, channel, and discharge storm water upon neighboring land. Under existing law, neighbors who have a genuine dispute for discharging storm water toward each other have the right to go to court and seek damages and/or injunctive relief. Therefore, these Bills do nothing more than create a duplicate remedy which already exists in common law.

In our experience, disputes concerning discharge of water are often like fence line disputes. Many times these disputes arise because neighbors do not get along. Often times these disputes are not legal problems but are people problems. The intervention of government makes the dispute worse, not better, while presenting a substantial burden on local government. If neighbors have substantive water issues, the parties have an existing remedy, rather than invoking the investigative and adjudicative functions of local government.

In conclusion, the Hamilton County Commissioners request that the General Assembly vote no on the above Bills. As stated above, these Bills will create additional burdens and costs for local government. The disputes between neighbors concerning storm water can continue to be decided in the Court system as has been the case for over one hundred years, without government expanding its costs in times of fiscal difficulty.

We thank you in advance for your assistance. If you have any questions, please feel free to contact any of the undersigned, or Kenton Ward, the Hamilton County Surveyor at (317) 776-8495.

BOARD OF COMMISSIONERS
OF HAMILTON COUNTY


Steven C. Dillinger


Steven A. Holt


Christine Altman

enemy rule could be used “regardless of... whether the plaintiff asserts his claims as an action or negligence, trespass, or nuisance.” Luhnow, 760 N.E.2d at 631.

9. Artificial impoundments of water

A landowner who creates an artificial impoundment of water on his land will be liable to his neighbor if he permits it to escape and the neighbor is thereby injured. Gumz v. Bejes, 321 N.E.2d 851, 856 (Ind. App. 1975).

10. Drainage easement by written contract

If a tiled or open drain in need of repair serves your farm and neighboring land, you may want to check the recorder’s office to see if an written drainage easement or covenant exists; this could assign responsibility for drain maintenance.

A covenant that imposes an affirmative burden may run with the land and bind successors if:

- (1) The original covenantors intend it to run,
- (2) The covenant touches and concerns the land
- (3) There is privity of estate between subsequent grantees of the original covenantor and covenantee.

Moseley v. Bishop, 470 N.E.2d 773, 776 (Ind. App. 1984).

11. Drainage easement by implication

If a common owner of your land and your neighbor’s land established a drain, you may have an implied drainage easement. This might give you the right to maintain the drain located on the neighbor’s property.

In order for there to be a drainage easement implied by law, the servitude must be “(1) obvious, (2) permanent, (3) in use at the time the ownership in the land is severed, and (4) reasonably necessary... not merely convenient or beneficial.” Hartwig v. Brademas, 424 N.E.2d 122, 124 (Ind. App. 1981).

12. Drainage easement by prescription

It is also possible to acquire a drainage easement by prescription. Powell v. Dawson, 469 N.E.2d 1179, 1181 (Ind. App. 1984).

“A prescriptive easement is established by actual, open, notorious, continuous, uninterrupted, adverse use for twenty years [Ind. Code § 32-23-1-1] under claim of right, or by continuous adverse use with knowledge and acquiescence of the servient owner.” Powell, 469 N.E.2d at 1181.

13. Drainage across railroads

Railroads sometimes present drainage problems for adjoining landowners. The general powers of railroad corporations include:

To construct its road upon or across any stream of water, watercourse, highway, railroad, or canal, so as not to interfere with the free use of the same, which the route of its road shall intersect, in such manner as to afford security for life and property; but the corporation shall restore the stream or watercourse, road, or highway thus intersected to its former state, or in a sufficient manner not to unnecessarily impair its usefulness or injure its franchises. Ind. Code § 8-4-1-14(a)(5).

This section provides an action against a railroad for obstructing or damaging a drainage ditch or watercourse. See also, West Ind. Code Ann. § 8-4-1-14, notes 181-190.

14. Drainage and public roads

Drainage problems are often caused by poorly maintained and constructed ditches and culverts along and under public roads, which collect and cast water upon adjoining farmland. However, the common enemy rule and its limitations also applies to government entities. The Indiana Supreme Court has stated “[a] public corporation has no more right to collect water in an artificial channel, and cause it to flow upon the land of another in a greatly increased quantity, than has a private land owner.” Patoka Twp. v. Hopkins, 30 N.E. 896 (Ind. 1892).

Further, while a landowner may protect himself from flooding and surface water, when dealing with problems near a public road, he may not divert water in such a way that interferes with the public’s use and enjoyment of the road. Shelbyville & B. Turnpike Co. v. Green, 99 Ind. 205 (1884).

15. Indiana Tort Claims Act

When drainage problems are caused by public roads or regulated drains, concerns over the responsibility of a government entity may arise. Government entities may be liable for the torts committed by its agencies and employees. The Indiana Tort Claims Act grants immunity from tort liability for certain acts and establishes special procedural requirements if negligence or another tort is claimed. Ind. Code §§ 34-13-3-1 through section 25. For example, losses or damages arising from the performance of a discretionary function, authorized entry onto property or temporary conditions caused by weather are protected under the Tort Claims Act.

Although the Tort Claims Act provides blanket immunity from tort liability for losses occurring from authorized entry onto property, due care must be taken to avoid damaging crops, fences and other structures located around a regulated drain. Ind. Code § 36-9-27-33(c).

16. Takings of land

The Indiana Constitution, Article I, section 21, states, “No person’s property shall be taken by law, without just compensation...” Because the Tort Claims Act is limited to tort actions, it does not grant immunity for takings theories. It has been held that a state statute, such as the Tort Claims Act, may not be used to trump constitutional rights. Moore v. Porter County Drainage Board, 578 N.E.2d 380 (Ind. App. 1991).

Generally, the establishment of a regulated drain without compensation does not qualify as an unconstitutional taking of property. Johnson v. Kosciusko County Drainage Bd., 594 N.E.2d 798, 804-05 (Ind. App. 1992). However, in Van Keppel v. Jasper County Drainage Board, 556 N.E.2d 333, 336 (Ind. App. 1990), a landowner suffered damage to his property when the banks of a ditch had to be reconstructed. The court stated that a landowner can use an inverse condemnation action if an interest in land was taken for public use without compensation. If a trial court finds that a taking has occurred, it will appoint an assessor to calculate damages. Id.

a publication of



Legal Considerations for Solving Drainage Problems

*By M. Owen Mohler
Revised by Farm Bureau Staff 2010*

M. Owen Mohler is a former lobbyist and counsel for Indiana Farm Bureau, Inc. Mr. Mohler is deceased.

**Exhibit 2
Water Resources Study Committee
September 30, 2010**

225 S. East Street
P.O. Box 1290
Indianapolis, IN 46206
(317) 692-7840
1-800-866-1160 ext. 7840
www.infarmbureau.org

Indiana drainage laws are a combination of statutory and common-law theories. They are complex; often a landowner may pursue several remedies at one time.

If a landowner's drainage problem concerns the rights and responsibilities of other neighboring landowners, the landowner should discuss the problem with his neighbor. Both parties may want to consult with attorneys to make sure their rights are adequately represented.

The purpose of this brochure is to provide a checklist for you and your attorney of some of the legal remedies and theories you may want to use in solving a drainage problem. Please share this information with your attorney, who will have access to the statutes and court cases listed herein.

Before undertaking any drainage work, it is important to identify other environmental concerns present. The Indiana Department of Environmental Management, Natural Resource Conservation Service, Army Corp of Engineers and Indiana Department of Natural Resources may also have rules and regulations pertaining to your drainage problem.

1. Regulated drains

A regulated drain is an open drain, a tiled drain or a combination of the two. Ind. Code § 36-9-27-2. If a drain is regulated, "[t]he county surveyor is the technical authority on the construction, reconstruction, and maintenance" of the existing or proposed drain and should be able to inform you of the status of the drain. Ind. Code § 36-9-27-29.

The county surveyor classifies all regulated drains in the county as: drains in need of reconstruction, drains in need of periodic maintenance or drains that are to be vacated. Ind. Code § 36-9-27-34(a). Landowners may make a request to the county drainage board to classify or reclassify a drain affecting their land, provided at least 10 percent of the landowners make the request. Ind. Code § 36-9-27-35(c). The county surveyor will then submit a classification report to the board. Ind. Code § 36-9-27-35(a).

Upon approval of the classification report a long-range plan will be created by the surveyor. This plan will also be submitted to the board for approval. Ind. Code § 36-9-27-36(a). Landowners affected by a regulated drain can request the board to advance the date of referral to the surveyor for a

report, provided at least 10 percent of the owners make the request. Ind. Code § 36-9-27-36(d).

The drainage code provides a procedure for the board to act on the surveyor's maintenance and reconstruction reports, a discussion of which is beyond the scope of this article.

When a regulated drain is "obstructed or damaged by logs, trees, brush, unauthorized structures, trash, debris, excavating, filling, or pasturing livestock, or in any other way, the county surveyor shall immediately remove the obstruction and repair any damage." Ind. Code § 36-9-27-46.

If damage or an obstruction is caused by an owner of land, or by a person who enters upon the land under any contract, easement or statute, the surveyor can either require that person to remedy the problem or recover damages from him. Ind. Code §§ 36-9-27-46 and 47.

2. Establishment of a new regulated drain

If a drain cannot be established in the best and cheapest manner without affecting land owned by other persons, then you may want to consider establishing a new regulated drain. Ind. Code §§ 36-9-27-54 through 66 explains the procedure for establishing new regulated drains.

Ind. Code § 36-9-27-62 establishes a procedure for a county drainage board to assess the benefits and damages to a landowner affected by the establishment of a new regulated drain.

3. Obstruction of mutual drain or watercourse

Mutual drains are established to drain two or more tracts of land under different ownership. Ind. Code § 36-9-27-2. A natural surface watercourse is an area of ground surface over which precipitation occasionally and temporarily flows in a definable direction and channel. Ind. Code § 36-9-27.4-3.

A person may file a petition with the county drainage board seeking removal of an obstruction from a mutual drain or natural surface watercourse located outside the person's property. Ind. Code § 36-9-27.4-9. The petition must include a general description of: (1) the tract of land owned by the petitioner, (2) the need for the removal, and (3) the

site of the obstruction. Ind. Code § 36-9-27.4-10. The county surveyor will investigate the petition; upon finding an obstruction, the drainage board will hold a hearing to determine if removal requirements exist. Ind. Code §§ 36-9-27.4-12 through 14.

4. Increased flowage in a watercourse

An upper landowner may construct ditches and channels on his land to carry and drain surface water to an existing watercourse. However, he may not change the course of the water, or collect or concentrate the surface water and cast it on the lands of the lower owner, causing damage. Glick v. Marion Const. Corp., 331 N.E.2d 26, 31 (Ind. App. 1975).

Similarly, a lower landowner may not cause water to back up onto the property of an upper landowner. Gasway v. Lalen, 526 N.E.2d 1199, 1201 (Ind. App. 1988).

5. Surface water and the common enemy rule

If surface water is causing the drainage problem, Indiana's controversial "common enemy rule" may apply. First you must determine whether the water in question is diffused surface water.

Surface water includes water from falling rains or melting snows, diffused over the surface of the ground or flowing temporarily upon or over the surface which has no definite banks or channel. Trowbridge v. Torabi, 693 N.E.2d 622, 626-627 (Ind. App. 1998) (quoting Capes v. Barger, 109 N.E.2d 725, 726 (Ind. App. 1953)).

The common enemy rule states, "surface water which does not flow in defined channels is a common enemy and...each landowner may deal with it in such manner as best suits his own convenience. Such sanctioned dealings include walling it out, walling it in and diverting or accelerating its flow by any means whatever." Argyelan v. Haviland, 435 N.E.2d 973, 975 (Ind. 1982). Under this rule, you may "accelerate or increase the flow of surface water by limiting or eliminating ground absorption or changing the grade of the land." Argyelan, 435 N.E.2d at 976.

6. Limitations to the common enemy rule

If a neighbor is diverting surface water onto your land you should study the limitations to the common enemy rule. Importantly, this rule only applies to landowners making improvements to their own land, not upon a neighbor's land. Harlan Bakeries, Inc. v. Muncy, 835 N.E.2d 1018, 1033 (Ind. App. 2005).

The Indiana Supreme Court has also recognized an exception to the common enemy rule: "one may not collect or concentrate surface water and cast it, in a body, upon his neighbor." Argyelan, 435 N.E.2d at 976. The court also noted that "malicious or wanton employment of one's drainage rights" would likely be impermissible as well. Id.

7. Criticism of the common enemy rule

The common enemy rule has come under some criticism. In Rounds v. Hoelscher, 428 N.E.2d 1308 (Ind. App. 1981), the court attempted to adopt the "reasonable use rule" rather than the "antiquated" common enemy rule. Id. at 1315. Justice Hunter's dissenting opinion in Argyelan, 435 N.E.2d at 978 and dissent to the denial of transfer in Gilmer v. Board of Comm'r of Marshall County, 439 N.E.2d 1355 (Ind. 1982) also advocate the reasonable use rule, which is used in other jurisdictions.

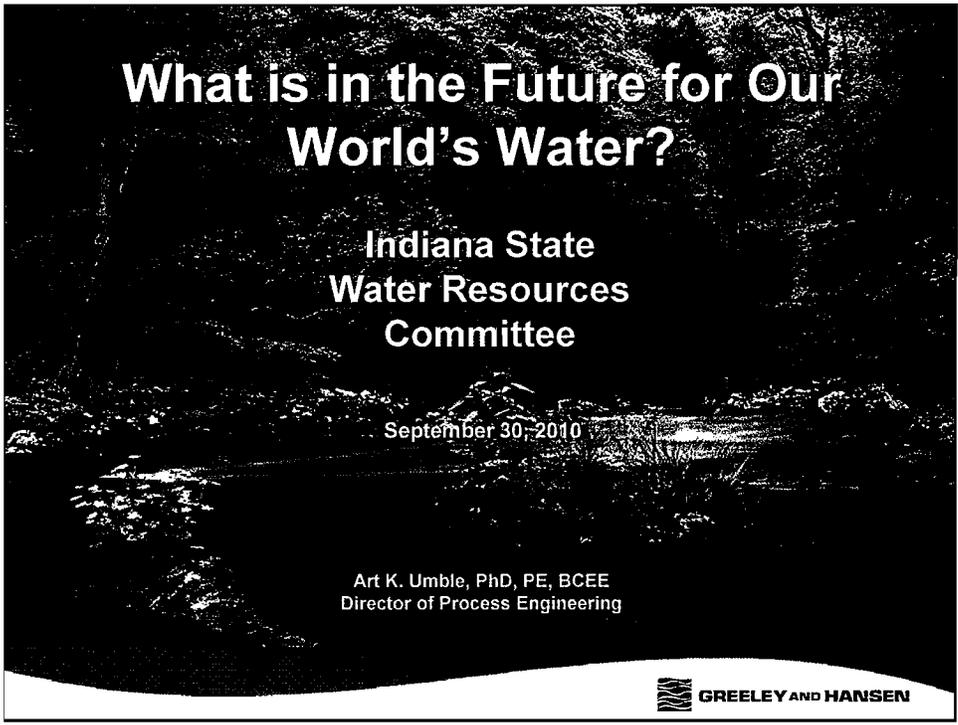
However, the Indiana Supreme Court rejected this new rule and reaffirmed the use of the common enemy doctrine in Argyelan, 435 N.E.2d at 977.

8. Nuisance action

The common enemy rule is often used as an affirmative defense to a nuisance action. Ind. Code § 32-30-6-6 defines a nuisance as "Whatever is: (1) injurious to health; (2) indecent; (3) offensive to the senses; or (4) an obstruction to the free use of property; so as essentially to interfere with the comfortable enjoyment of life or property."

Nuisance has generally been applied only to ponds and natural watercourses. However, in Luhnnow v. Horn, 760 N.E.2d 621 (Ind. App. 2001), the court noted that the surface water common

Umble



What is in the Future for Our World's Water?

Indiana State
Water Resources
Committee

September 30, 2010

Art K. Umble, PhD, PE, BCEE
Director of Process Engineering

 GREELEY AND HANSEN



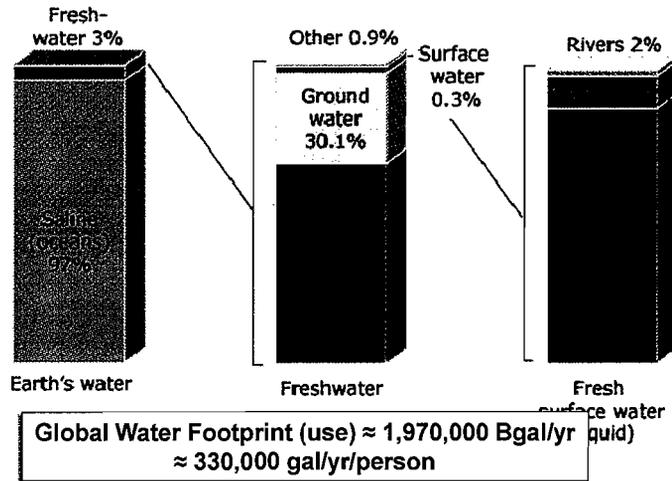
Outline

- Global Water Demand Projections
- Global Water Supply – Demand Gap
- What is Our Role in the Global Water Challenge?
- A New Paradigm for Thinking about Global Water
- Some Questions to Ponder

2

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Our World's Water Distribution



3

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How Much is "1 Billion Gallons"?

Hoover Dam can deliver —
up to 250 billion gallons
in one day...enough to fill
625 Lucas-Oil Stadiums !!!

4

GREELEY AND HANSEN

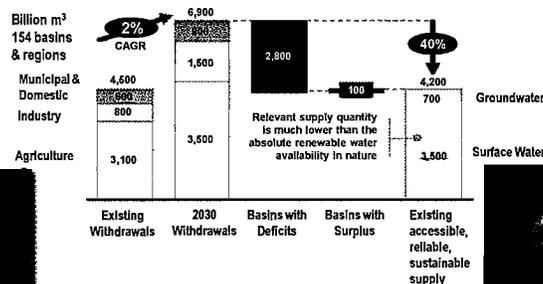
Challenges and a Pathway to Framing Solutions

- 1) Quantify the Supply – Demand Gap at the Global Scale
- 2) Quantify a Menu of Technical Measures to Close the Gap at the Country / Regional Level
- 3) Analyze Scenarios Reflective of Economic, Political and Societal Realities
- 4) Invoke Methodologies to Engage Policy Makers and Stakeholders

5

Establishing the Projected Gap

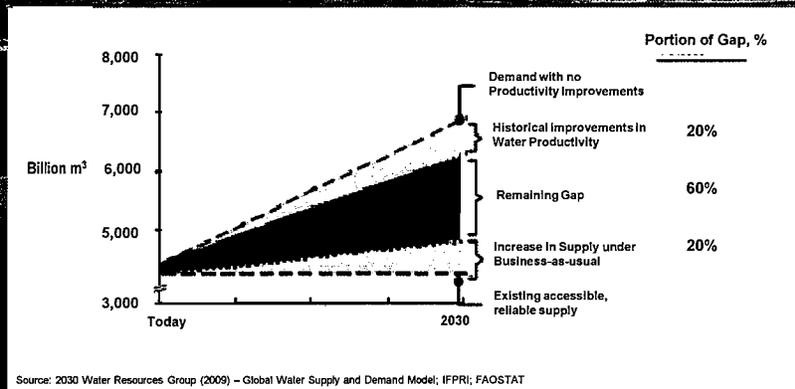
Aggregated Global Gap between existing accessible, reliable supply and 2030 water withdrawals, assuming no efficiency gains



Source: 2030 Water Resources Group (2009) – Global Water Supply and Demand Model; baseline agricultural production based on IFPRI IMPACT-WATER base case

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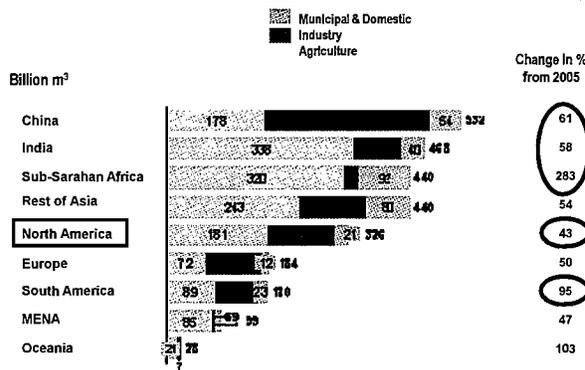
Business-as-Usual Approaches will not Meet Demand for Raw Water



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Projected Increase in Annual Water Demand 2005 – 2030

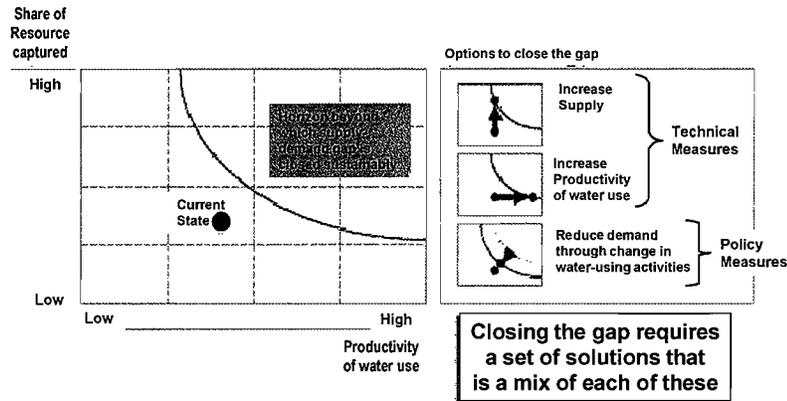


Source: 2030 Water Resources Group (2009) – Global Water Supply and Demand Model; baseline agricultural production based on IFPRI IMPACT-WATER base case

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GREELEY AND HANSEN

Three Options for Closing the Supply-Demand Gap

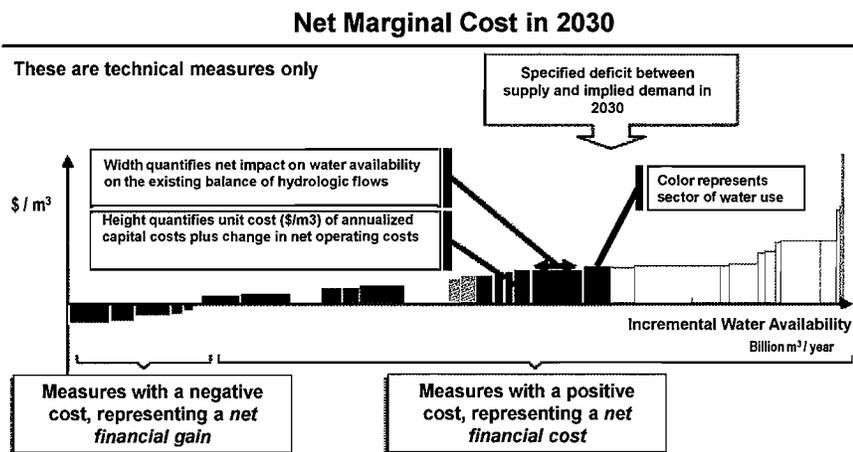


Source: 2030 Water Resources Group (2009)

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GREELEY AND HANSEN

The Water Availability Cost Curve: Supply-Demand Deficit

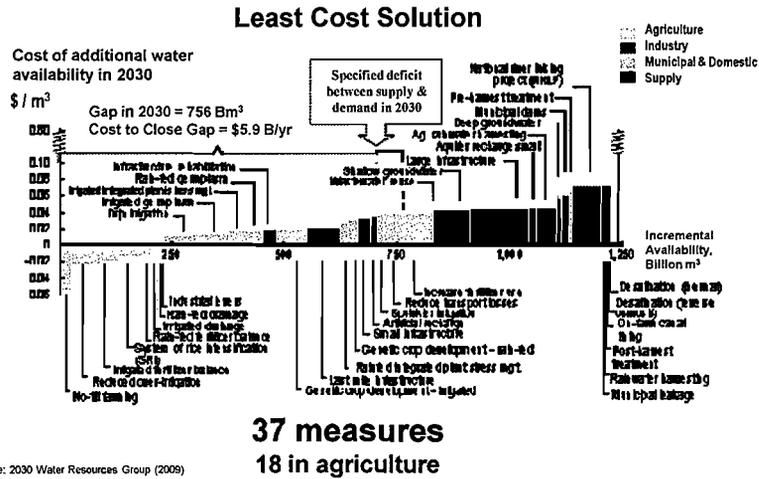


Source: 2030 Water Resources Group (2009)

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GREELEY AND HANSEN

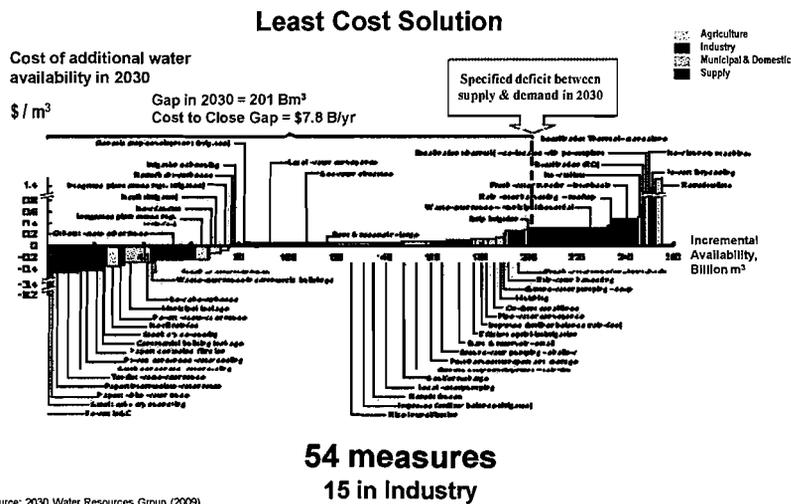
India – Water Availability Curve



11

GREELEY AND HANSEN

China – Water Availability Curve

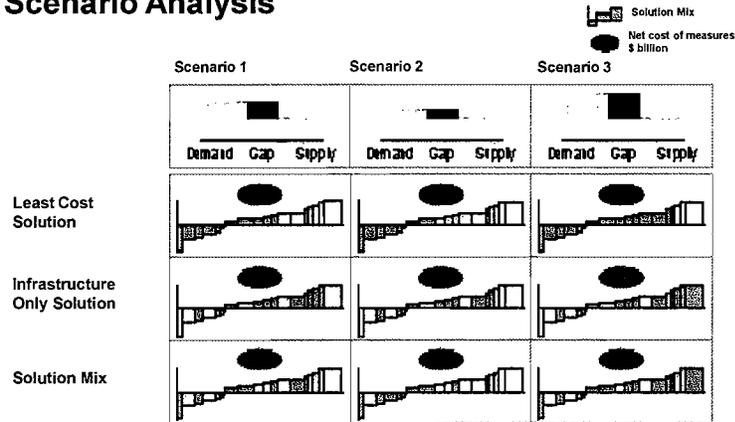


12

GREELEY AND HANSEN

Embedding the Cost Curve in the Real World – tools for policy makers

Scenario Analysis

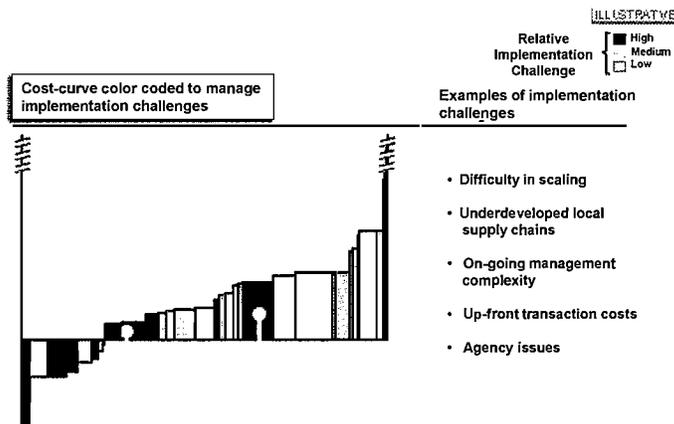


Source: 2030 Water Resources Group (2009)

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GREELEY AND HANSEN

Embedding the Cost Curve in the Real World – tools for policy makers



Source: 2030 Water Resources Group (2009)

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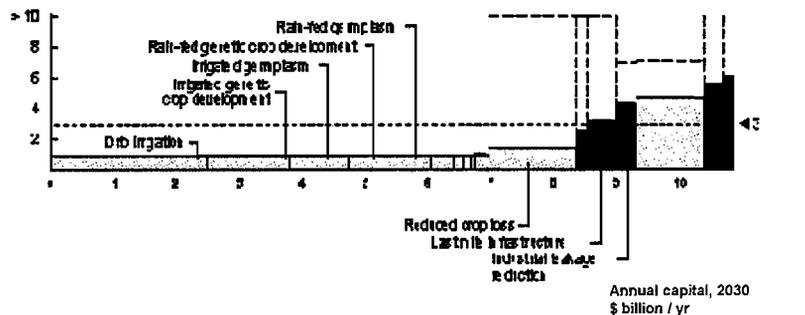
GREELEY AND HANSEN

Embedding the Cost Curve in the Real World – tools for policy makers

India – Effect of water price increase on Payback Curve

End-user payback period

Years

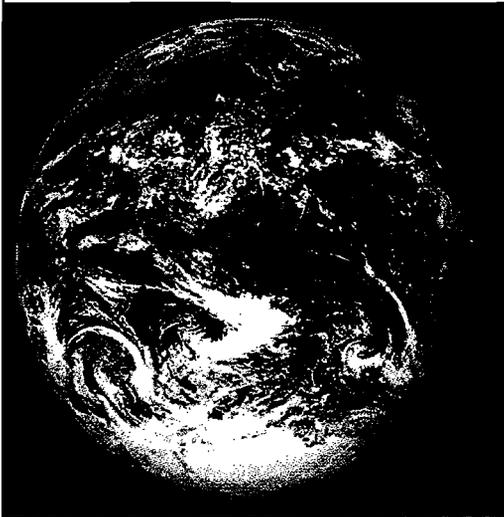


Source: 2030 Water Resources Group (2009)

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What is Our Role in this Global Water Challenge?



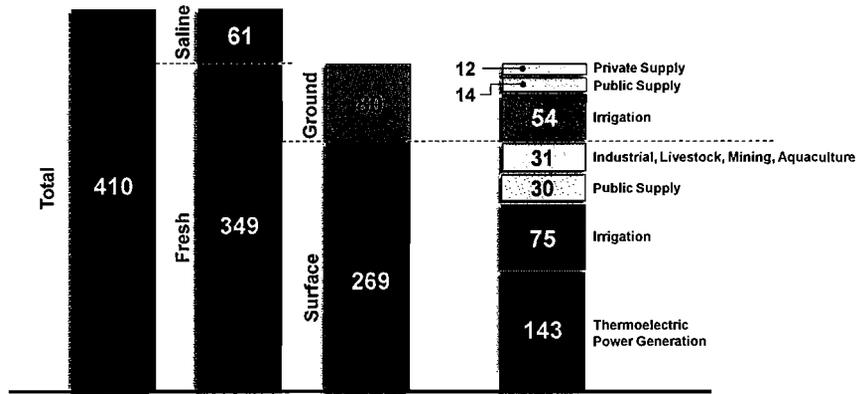
- How much water do we use here in the US?
- How much water do we use here in Indiana?
- How much water do we need?
- How can everyone get what they need?

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Annual US Water Consumption

Water Withdrawals, Billion gal/d



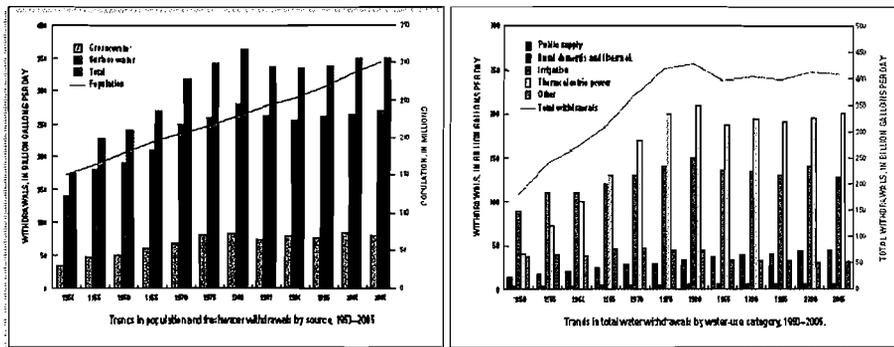
Estimated reliable water storage in US is 475 trillion gallons

Source: *Estimated Use of Water in the US in 2005*
Circular 1344USGS (2009);
2030 Water Resources Group (2009)

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Annual Water Consumption Trends in US



America is:

- 1) Using less water
- 2) Being more productive with the water being used
- 3) Power generation and irrigation dominant all uses

Source: *Estimated Use of Water in the US in 2005*
Circular 1344USGS (2009)

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Annual US Water Withdrawals



Source: *Estimated Use of Water in the US in 2005*
Circular 1344USGS (2009)

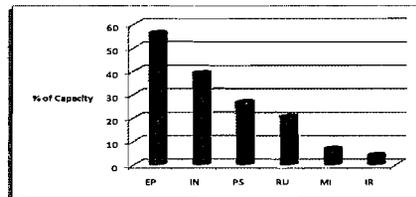
Intensity of Water Withdrawals



Source: *Estimated Use of Water in the US in 2005*
Circular 1344USGS (2009)

Annual Water Withdrawals for Indiana - 2009

	Withdrawals (billion gal/d)	Capacity (billion gal/d)	Fraction of Capacity
Surface Intakes	7.65	17.94	42.6%
Wells	0.60	5.01	11.9%
Total	8.25	22.95	35.9%



EP = Electric Power
 IN = Industry
 PS = Public Supply
 RU = Rural Use
 MI = Miscellaneous
 IR = Irrigation

Source: IDNR (2009)

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What is the Current Status of the US in Terms of Water Use?

Sufficient	> 450,000
Stress	265,000 – 450,000
Scarcity	132,000 – 265,000
Extreme Scarcity	< 132,000

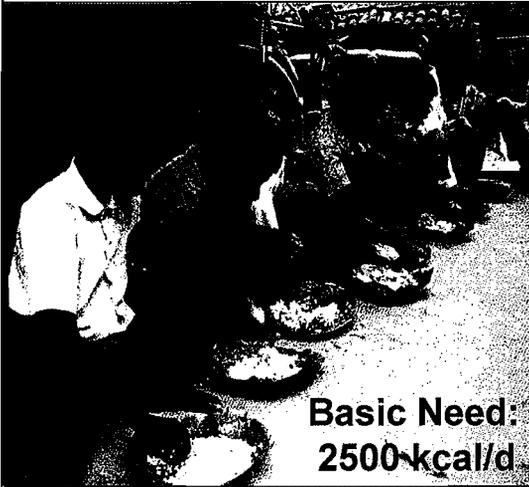
USA ≈ 437,000 gallons / person / year
 1,200 gallons / person / day

How much water do we need?

Falkenmark & Widstrand, 1992
 22

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Annual Water Needs per Person for Sustainable Nutrition



**Basic Need:
2500 kcal/d**

Diet: Vegetarian

Theoretical = 66,000 gal/yr

Actual ≈ 198,100 gal/yr

Diet: 20% Meat

Theoretical = 180,000 gal/yr

Actual ≈ 356,600 gal/yr

- Global population is growing; projected to double by 2070;
- Expanding populations demand increased food production;
- Developing economies demand higher protein diets.

Zehnder, 2008

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Water Needed in Meat Production

Approximately 12,000 gallons of water needed per pound of beef

Rule of Thumb: 10x more water is needed per unit of energy from meat than from plant materials

Animals convert about 10% of the energy from the plant material they consume into meat.

Zehnder, 2008
Robbins, 2001

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Water Requirements to Produce 1 lb of Plant Material

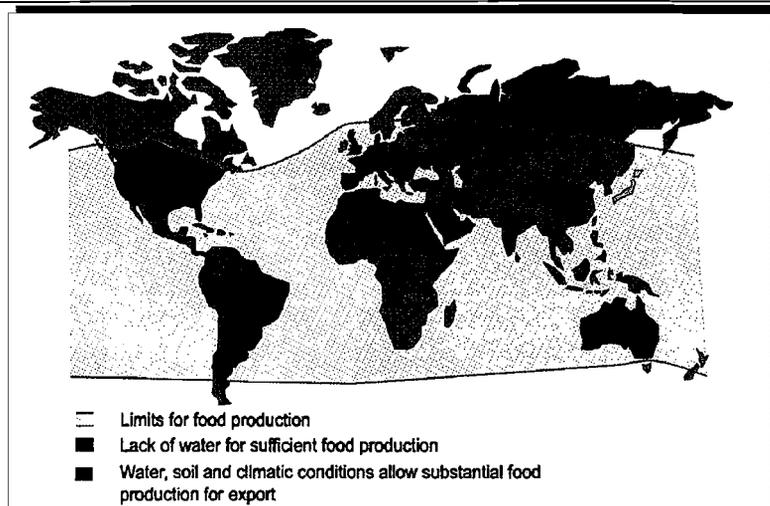
Sorghum	30 gal
Corn	42 gal
Clover	55 gal
Wheat	60 gal
Potatoes	76 gal
Cucumber	86 gal
Alfalfa	108 gal

Rule of Thumb: 1 lb of bread requires 120 gallons of water

25 Muller, 1974

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Global Food Production Regions



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Zehnder, 2002

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The Concept of “Virtual Water”

Virtual Water (or hidden water) refers, in the context of trade, to the water used in the production of a good or service.

- measures how water is embedded in the production and trade of food and consumer products.

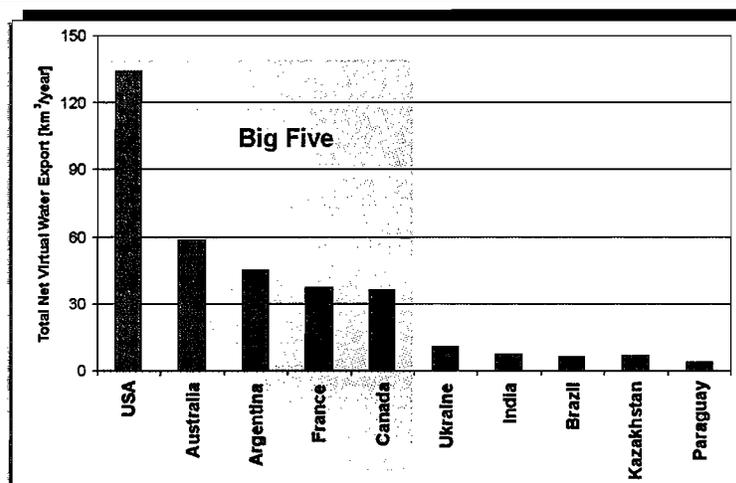
“Virtual water has major impacts on global trade policy... especially in water-scarce regions, and has redefined discourse in water policy and management. By explaining how and why nations such as the US, Argentina and Brazil ‘export’ billions of litres of water each year, while others like Japan, Egypt and Italy ‘import’ billions, the virtual water concept has opened the door to more productive water use.”

– John Anthony Allen - 2008

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Main Food Exporting Countries

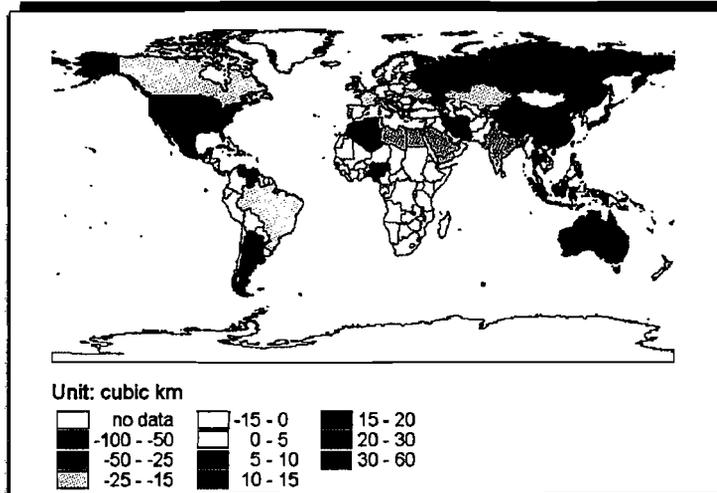


Adapted from Liu, et al., 2007

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Net Virtual Water Trade by Country (average over 1997 – 2001)

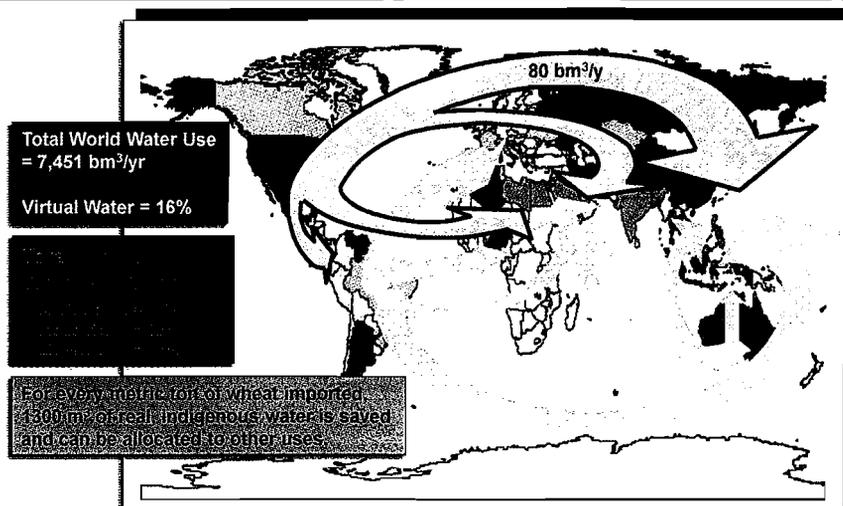


Yang, et al., 2007; Chapagain & Hoekstra, 2008

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Virtual Water Flows by Regions (average over 1997 – 2001)

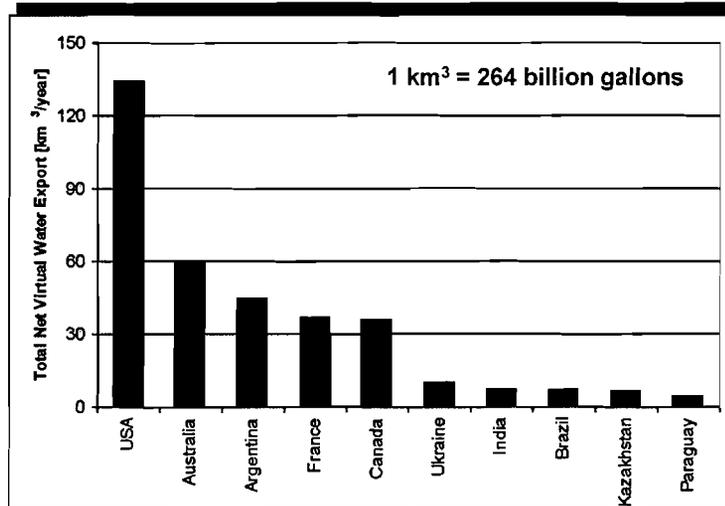


Yang, et al., 2006; Chapagain & Hoekstra, A. 2008

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Virtual Water Exporters



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Liu, et al., unpublished

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Questions for Deliberation

The assumptions in virtual water is that all water, i.e., rain, surface or ground is of equal value.

Is this valid?

Is it correct to assume that water “released” from a water-intensive activity will then be allocated to a less water-intensive activity?

Can virtual water be used as an environmental indicator for the “exporting” country/region?

Is it ethical to assume “importing” countries do so intentionally to protect their scarce water resource?

Is it appropriate to increase the price of our exports to account for our water resource and environmental impact?

Is it appropriate to limit our virtual water export to our own domestic needs in other regions?

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What should Indiana be Doing Now?

Current Status:

- We have limited local supplies in the fastest growing metropolitan area.
- We have 20 yrs of monthly reported water use data across the state. This is unusual and valuable.

Current Needs:

- Indiana should require regional water supply planning.
- The state needs to be divided into manageable, hydrologically defined, water supply regions.

Tools:

- Water demand forecasts can be developed for the defined water use regions.
- Flow models are used to determine whether or not the current use is sustainable.

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Summary

- The global water crisis is upon us now and growing
- Business-as-usual water management is not sustainable
- There's enough water for all; the issue is making the trade-off choices that seek self-sufficiency
- USA is not "water scarce"; our challenge will be managing our virtual water resource
- Virtual water is a key to global water sustainability
- USA is the world's "exporter" of virtual water
- Exporting exerts an indirect pressure on water resources in US (e.g., Ogallala, Colorado River)
- Virtual Water is redefining the "price of water"
- Virtual Water beckons technological innovation

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THANK YOU

Art Umble

aumble@greeley-hansen.com
317-924-3380

Link to 2030 Water Resource Group Report

http://www.mckinsey.com/client-service/Water/Charting_our_water_future.aspx

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Indiana's Water Resources Task Force

Indiana's Water Resources Task Force

The Water Resources Task Force was created in 2009 by the Indiana General Assembly through Indiana Code 14-25-16. The Task Force was established to study and make recommendations concerning a number of issues related to water availability as an economic and environmental necessity. The Water Resources Task Force is composed of a diverse and experienced group of professionals representing:

- Public Water Supply Utilities
- Agriculture
- Steam Electric Generating Utilities
- Industry
- Municipalities
- Environmentalists
- Consumer Advocates
- Economic Development Advocates
- Academia
- Public

The Water Resources Task Force conducted its initial meeting on August 27, 2010, in the Indiana Government Center. A chairperson and a vice-chairperson were appointed from members of the Task Force.

In addition, PowerPoint presentations entitled "Overview of available quantities and sources of water" and "The determination of ownership rights, particularly in ground water", were made by Department of Natural Resources staff. Indiana code 14-25-16 requires the Task Force to provide an annual report of activities and recommendations to the Water Resources Study Committee.

For more information or questions regarding the Water Resources Task Force, please contact the Department of Natural Resources by e-mail at DNR Water Resources Task Force.

Meeting Summaries

- August 27, 2010 Meeting Summary

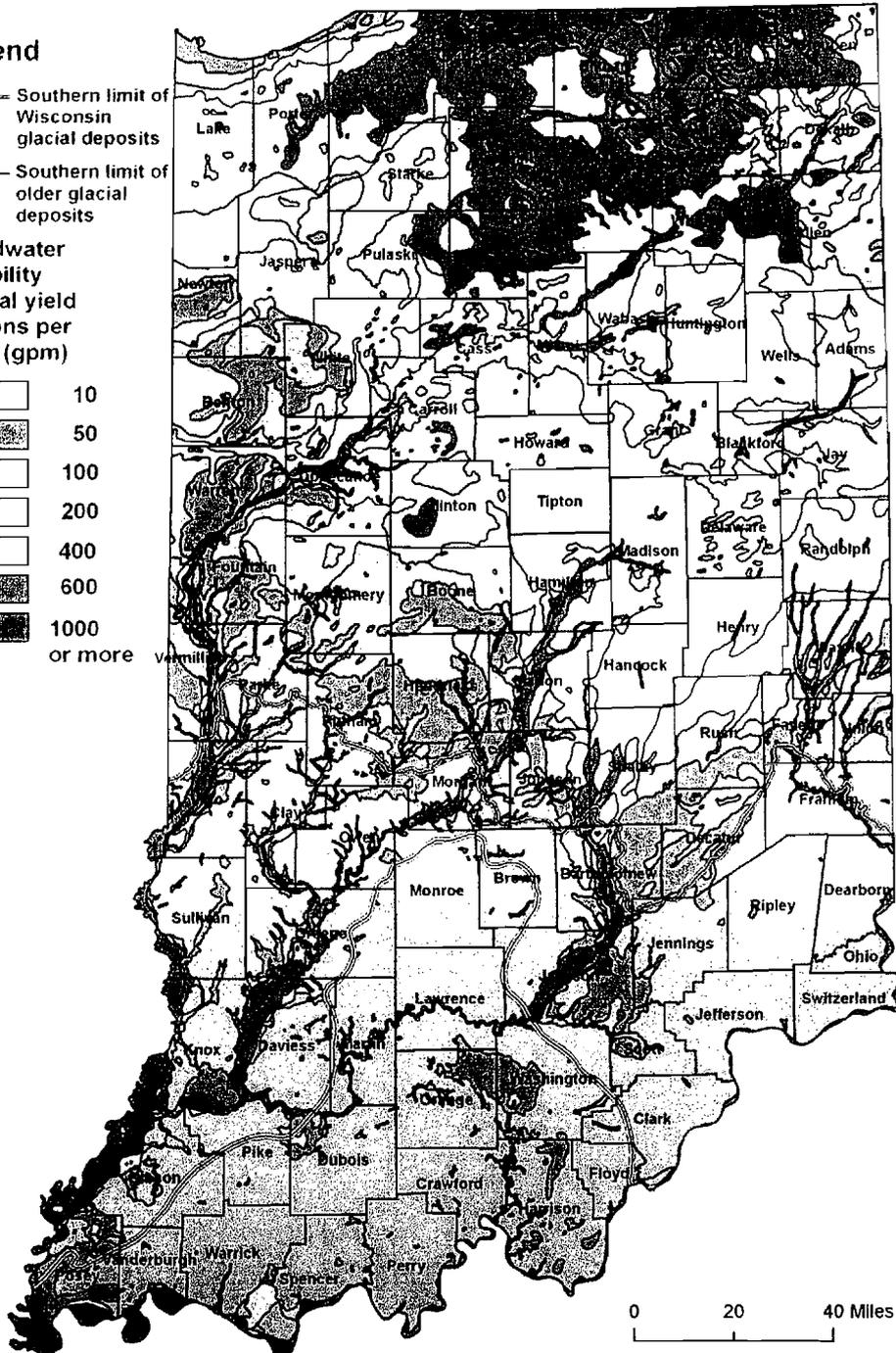
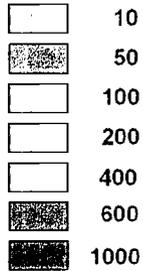
Water Resources Task Force

Task Force Position	Name	Affiliation
Steam electric generating utilities (Chair, Water Resources Task Force)	<u>Stan Pinegar</u>	Indiana Energy Association
Municipalities (Vice-Chair, Water Resources Task Force)	<u>Ted Nitza</u>	City of Fort Wayne
Public Water Supply Utilities	<u>Mike Stewart</u>	Indiana American Water
Agriculture	<u>Sarah Simpson</u>	Indiana State Department of Agriculture
Industrial users	<u>Patrick Bennett</u>	Indiana Manufacturers Association
Academic experts in aquatic habitat and hydrology	<u>John Lee, Ph.D.</u>	Purdue University
Environmentalists	<u>Lynn Dennis</u>	Indiana Chapter of the Nature Conservancy
Consumer advocates	<u>Scott Bell</u>	Office of the Utility Consumer Counselor, Director of Water/Wastewater
Economic development advocates	<u>Pamela Fisher</u>	Indiana Economic Development Corporation
Public	<u>Kay Nelson</u>	North west Indiana Forum

Legend

- Southern limit of Wisconsin glacial deposits
- Southern limit of older glacial deposits

Groundwater Availability potential yield in gallons per minute (gpm)



1980

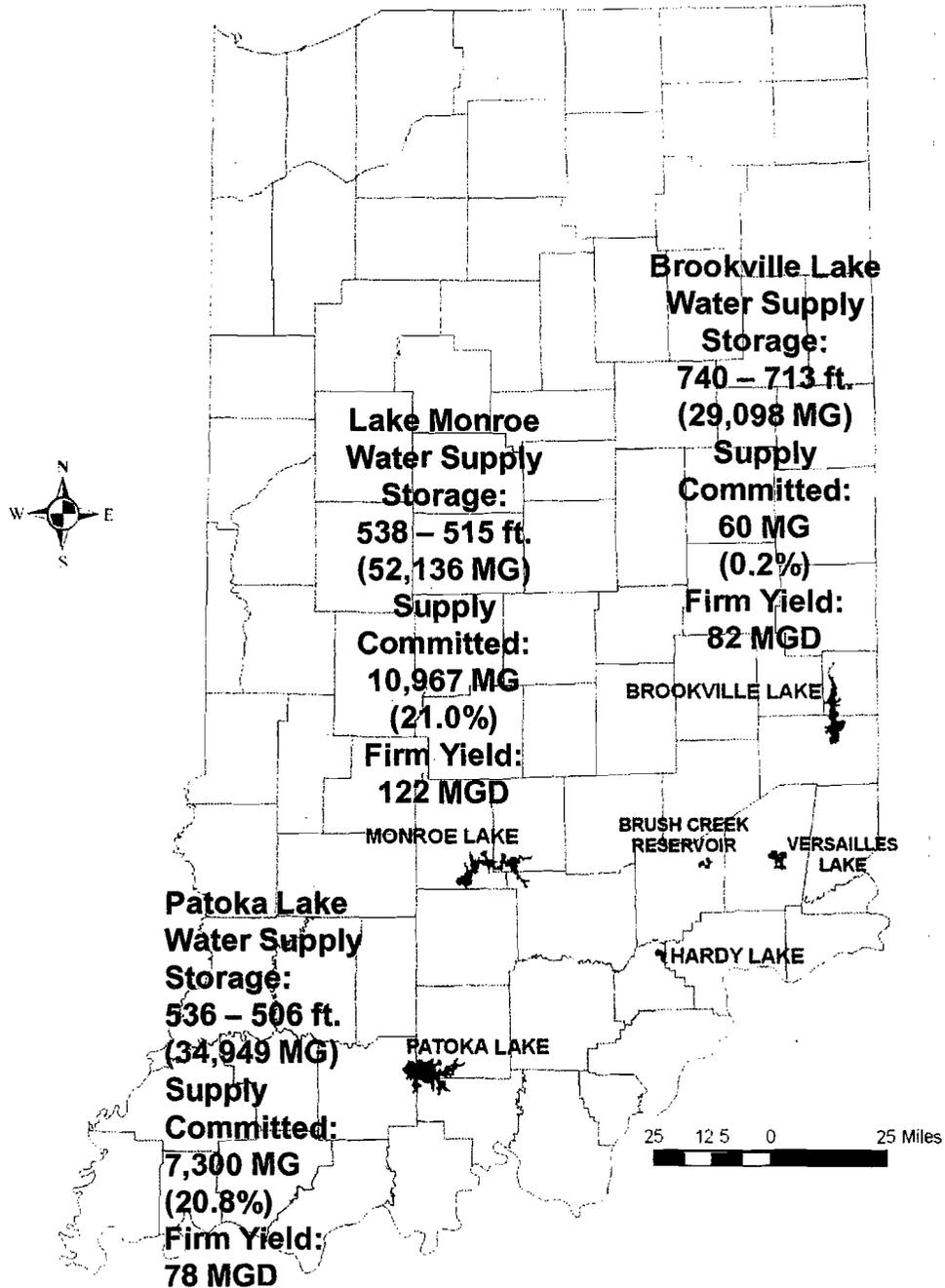
THE INDIANA WATER RESOURCE

AVAILABILITY, USES, AND NEEDS

THE INDIANA WATER RESOURCE

RECOMMENDATIONS FOR THE FUTURE

State-Owned Water Supply Storage



8/24/2010

D. Percolating Ground Water (Common Law Based on English Rule Reaffirmed)

The Indiana Supreme Court generally reaffirmed common law based on the English Rule. “Groundwater is part of the land in which it is present and belongs to the owner of that land.” Where a person uses or disposes of percolating groundwater for a beneficial purpose, damage that results to another is not actionable unless the damage is deliberate or gratuitous.

Wiggins v. Brazil Coal and Clay Corp. at 964.

1. Welcome and Introductions by Ron McAhrn, Deputy Director of IDNR.
 - All Task Force members present and introduced.
 - Report of appointment by IDNR director of Chairperson and Vice Chairperson of Water Resources Task Force: Chairperson – Stan Pinegar, Indiana Energy Association; Vice Chairperson – Ted Nitza, City of Fort Wayne Utilities.
2. Overview of Task Force responsibilities by Chairperson Stan Pinegar.
 - IC 14-25-16 sets forth 6 criteria for study and recommendations by the WRTF.
 - Task force members are appointed for four (4) year terms. Members must attend a minimum of 50 percent of scheduled meetings or be replaced by IDNR director. A majority of affirmative votes (minimum of 6) needed for action on a measure. Annual report of WRTF activities and recommendations shall be made to Water Resources Study Committee and Legislative Council.
 - Task force will receive assistance from state agencies specified in IC 14-25-16-4, and others invited by the IDNR director.
3. PowerPoint of Available Quantities and Sources of Water presented by Jerry Unterreiner, Head, Resource Assessment Section, IDNR Division of Water.
4. PowerPoint of Indiana Water Rights presented by Stephen Lucas, Director, Division of Hearings, Natural Resources Commission.
5. Discussion of Task Force methodology and time frames to address issues specified in IC 14-25-16.
 - Proposal for Task Force to meet on a quarterly basis.
 - Possible use of subcommittees to address individual issues/topics.
 - Task Force efforts will recognize efforts of Water Resources Study Committee.
 - WRTF and discussion issues primarily in response to Water Shortage Task Force recommendations
6. Great Lakes Compact requires development of water conservation and efficiency guidance documents by December, 2010. The WRTF can provide input prior to submission.
7. Regional Water Committees are required in order to evaluate long range planning of water resources
 - USGS gaging network necessary for adequate evaluation of ground water and surface water resources.
 - Water Shortage Task Force put considerable effort into development of final recommendations.
 - Regional planning is important but state lacks structure and funding.
8. Opportunities to work with neighboring states regarding shared drinking water resources (Issue #6) is an important issue to address. Indiana needs to work with surrounding states with regard to development of Ohio River ground water resource.
9. Task Force must determine to whom recommendations are being made. Existing law and policy can be revised in response to recommendations. Task Force must start with something “doable”.
10. Recommendation made that Task Force should promote water conservation and priority of use through legislation.
11. Indiana has abundant water resources but they are not evenly distributed. Challenge is to deliver water to appropriate areas in the most effective manner.
12. Chairperson recommended that goals be set prior to next meeting.
 - Quarterly meetings seem appropriate with one additional meeting conducted in 2010.
 - Additional information necessary to prioritize issues 1 through 6.
 - Subcommittee structure should be considered as method to address each issue.

**Exhibit 5
Water Resources Study Committee
September 30, 2010**

Ad Hoc Dedicated Funding Group:

Indiana Association of Soil and Water Conservation Districts
Indiana Conservation Alliance
Indiana Farm Bureau
Indiana Wildlife Federation
The Nature Conservancy

Share a belief that we need to conserve our soils, protect our waters, ensure the sustainability of our farms, forests and habitat for fish and wildlife.

Good conservation is strategic and planned, and an important part of that equation is consistent and stable funding, which Indiana has been lacking.

Together we:

- Researched other states natural resource programmatic and funding mechanisms.
- Participated in conference calls with a couple of states that have either recently enacted a funding mechanism or are in the process of creating a funding mechanism.
- Agreed that the Iowa example was a good road map for Indiana to follow.

How would this look for Indiana?

The General Assembly would enact a statute to create an advisory committee similar to what Iowa did in 2006. They created a Sustainable Natural Resource Funding Advisory Committee. Our committee would be created by statute and would be charged with the following:

- (1) Collect data regarding natural resource protection programs, funding and funding mechanisms in other states.
- (2) Collect programmatic and funding data on current natural resource protection programs here in Indiana.
- (3) Explore options for creating a conservation funding mechanisms in Indiana.
- (4) Determine the natural resource needs of Indiana, what we have and what we need, and develop an outline of the total revenue needed and what would be accomplished if the conservation funding initiative were implemented.
- (5) Complete an analysis of ~~Iowa~~ *Indiana* citizens' willingness to pay for such an initiative.

Advisory committee would be made up of legislative and executive branch appointments, as well as a diverse group of organizations with conservation interests and expertise.

Committee would begin work by July 1, 2011 and would make a final report with findings and recommendations to the Legislative Council and the Governor by November 1, 2012.

There would be a sunset date of May 1, 2013.

Concept has been presented to the Water Resources Study Committee, Environmental Quality Service Council and the Natural Resources Study Committee. We are asking support for the creation of the Sustainable Natural Resources Advisory Committee.

A CONCURRENT RESOLUTION creating the Sustainable Natural Resource Funding Advisory Committee.

Whereas, natural resources provide benefits across Indiana such as working farms, clean water and habitat for our native fish and wildlife, as well as outdoor recreation and healthy activities for Hoosier families;

Whereas, our prime soils and sustainable agriculture and hardwood industry provide positive economic impacts for the state and continues our cultural heritage of the family farm and the pastoral landscapes beloved by many;

Whereas, Indiana citizens have been well-served by our Departments of Agriculture, Environmental Management and Natural Resources, along with their many partners in federal and local government and the private and nonprofit sectors;

Whereas, there is more that can be done and partnership opportunities that have been lost. Current funding for programs, such as Clean Water Indiana, the Indiana Heritage Trust, and the Division of Forestry have been substantially diminished while others, such as a payment in lieu of tax and a farmland preservation program, have yet to be realized;

Whereas, the inability of Indiana to regularly generate the requisite funding needed to secure matching funds available through federally administered conservation programs contributes to Indiana's status as a "donor" state with Indiana taxpayers paying more in federal taxes than we realize in federal expenditures in our state: Therefore,

Be it resolved by the House of Representatives
of the General Assembly of the State of Indiana,
the Senate concurring:

SECTION 1. That the Sustainable Natural Resource Funding Advisory Committee shall be created to study how to provide a stable, suitable and sufficient funding for natural resource needs in Indiana.

SECTION 2. That the Sustainable Natural Resource Funding Advisory Committee shall collect data regarding natural resource programming, funding and funding mechanisms in other states, particularly our neighboring states and other Midwest states.

SECTION 3. That the Advisory Committee shall issue a preliminary report to the General Assembly and the Governor by November 1, 2010, with a final report by November 1, 2011. The report shall contain, but is not limited to the following:

- a. Information on what surrounding states have done programmatically to ensure conservation of natural resources and what they have done to provide sustainable funding for natural resource conservation.
- b. Options for conservation funding mechanisms.
- c. Outline of the amount of revenue needed and what would be accomplished if the conservation funding initiative is implemented.
- d. Analysis of Indiana's citizens' willingness

SECTION 4. The Advisory Committee will be staffed through coordinated efforts of:

- a. the Legislative Services Agency,
- b. the Department of Agriculture, and
- c. the Department of Natural Resources.

SECTION 5. That it is recommended that the Advisory Committee shall be composed of one member from each caucus in both the Indiana Senate and Indiana House of Representatives, with the majority member in each house serving as co-chairs, as well as:

- a. State Director of Department of Agriculture or designee.
- b. State Director of the Indiana Department of Natural Resources or designee.
- c. Commissioner of the Department of Environmental Management or designee.
- d. One representative from each of the following organizations:
 - 1) Indiana Wildlife Federation – Sportsman's Roundtable.
 - 2) Pheasants Forever.
 - 3) Indiana Association of Soil and Water Conservation Districts.
 - 4) Indiana Farm Bureau.
 - 5) The Nature Conservancy.
 - 6) One (1) representative of an environmental organization.
 - 7) Indiana Forestry and Woodland Owners Association.
 - 8) Indiana Park and Recreation Association
 - 9) Indiana Land Protection Alliance
 - 10) One (1) representative from a lake or watershed organization.
 - 11) Three (3) representatives from public universities providing research, science and policy analysis.

Exhibit 6
Water Resources Study Committee
September 30, 2010