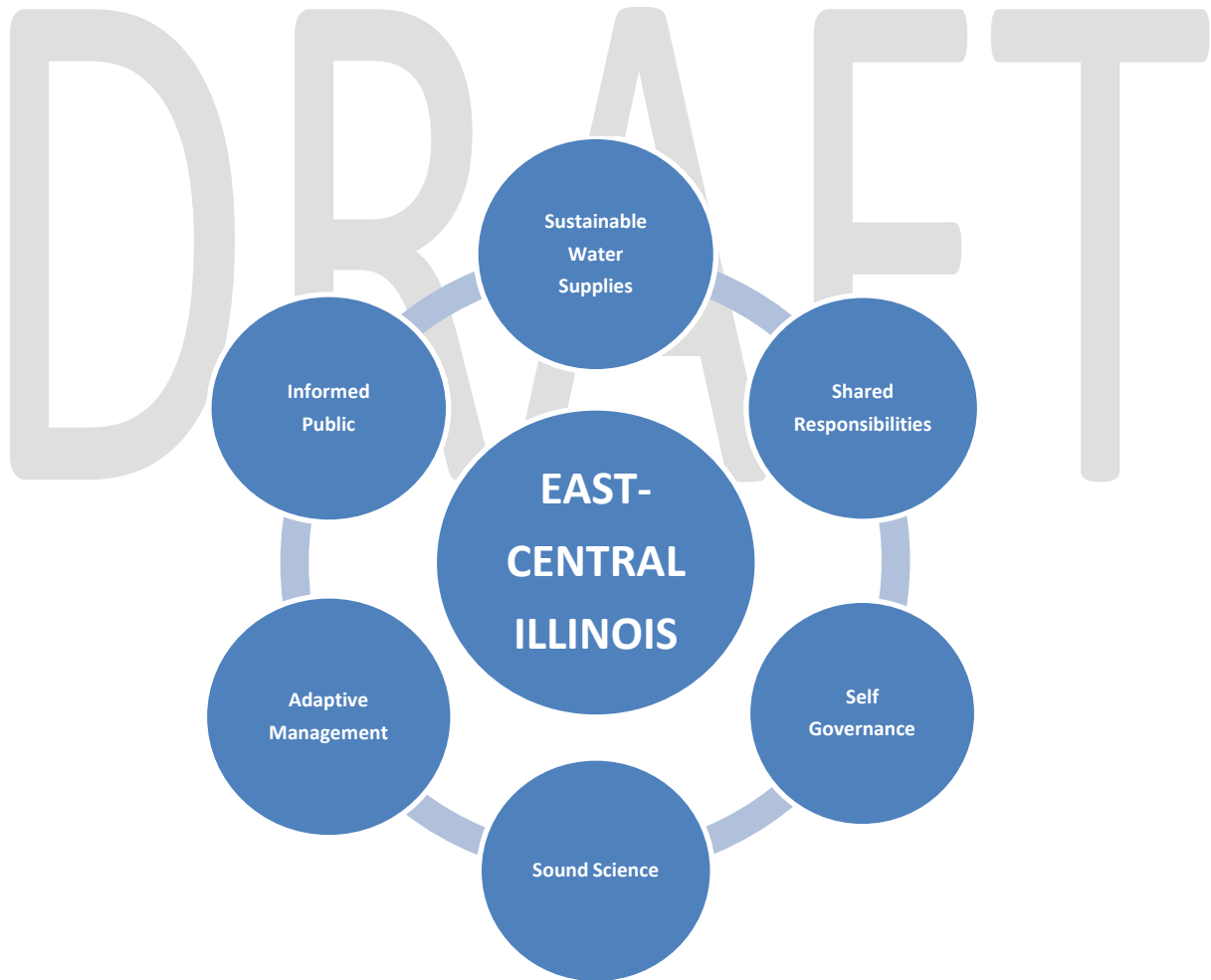


1 **A Plan to Improve the Planning and**
2 **Management of Water Supplies**
3 **in East-Central Illinois**

4
5 **by**

6 **East-Central Illinois Regional Water Supply Planning Committee**



June 2009

DRAFT

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37 under contract to
38 the Illinois Department of Natural Resources, Office of Water Resources, Springfield, IL.
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43 Champaign, Illinois

DRAFT

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204 the Illinois Department of Natural Resources, Office of Water Resources, Springfield, IL
205

206 June 2009, Champaign, Illinois
207

208 **EXECUTIVE SUMMARY**

209
210
211 East-Central Illinois is not facing an immediate water crisis, but the East-Central Illinois Water Supply
212 Planning Committee (the Committee) is driven by a desire to avoid crises that sometimes plague other
213 states and countries. A recent headline describes the water problems in the southeastern United States:
214

215 **“Georgia Water Woes: Drought Leads to Widespread Water Shortages”**
216

217 The Committee believes strongly that stakeholders in the region can shape the future, rather than
218 allowing runaway events to take control and crises to occur. A regional plan – a framework for action
219 and a series of action items – provides a means to shape the future. It is the Committee’s belief that
220 implementation of a regional plan can lead to more desirable headlines, such as:
221

222 **“Sustainable Water Supplies for East-Central Illinois”**
223
224

225 **MANDATE**
226

227 The regional plan has been developed by the Committee in compliance with Executive Order 2006-
228 01 issued by the Governor directing the Illinois Department of Natural Resources, in coordination with
229 the Illinois State Water Survey, to engage in regional water supply planning.
230
231

232 **PLANNING PROCESS**
233

234 To implement the Executive Order, the Office of Water Resources of the Illinois Department of
235 Natural Resources signed a contract with the Mahomet Aquifer Consortium to complete over a three-
236 year period specified tasks in a priority water quantity planning area for 15 counties in East-Central

237 Illinois: Vermilion, Iroquois, Ford, Champaign, McLean, Macon, DeWitt, Piatt, Woodford, Tazewell,
238 Mason, Logan, Menard, Cass and Sangamon. The regional plan focuses on the Mahomet Aquifer System
239 that underlies a large portion of the planning area together with the surface waters of the major river
240 basins. Funding for the crucial third year was not provided and this caused some important tasks in the
241 work plan to be curtailed.

242
243 Wittman Hydro Planning Associates, Inc. of Bloomington, Indiana, developed for the Mahomet
244 Aquifer Consortium and the Committee scenarios of how much water may be needed in the region to
245 2050.

246
247 Using the water demand data provided by Wittman Hydro Planning Associates, Inc. and geological
248 data and information provided by the Illinois State Geological Survey, the Illinois State Water Survey
249 conducted analyses to evaluate how drought, climate change, water withdrawals and discharges affect
250 streamflow, reservoir yield and groundwater availability. Most of this work was conducted under
251 contract with the Office of Water Resources of the Illinois Department of Natural Resources. A final
252 report from the State Surveys was not available for the Committee's use; therefore, the Committee
253 relied upon preliminary results in the form of draft materials and PowerPoint presentations on climate
254 scenarios, groundwater flow modeling results, and surface water yield analyses to form its
255 recommendations.

256
257 From March 2007 through June 2009 the Committee held 31 public meetings, received public
258 comments, was briefed on and discussed many aspects of water supply planning and management, and
259 conducted outreach and educational activities.

260
261 The regional water supply plan builds on the Committee's findings: key findings are summarized
262 after the recommended regional plan below. Major relevant features of the region, including a summary
263 of the water demand scenarios, are described in Appendix 1 of the report. Appendix 2 provides an
264 overview of water supply planning and management relevant to East-Central Illinois.

267 **RECOMMENDED REGIONAL WATER SUPPLY PLAN**

270 **A FRAMEWORK FOR ACTION**

271
272 The Committee selected a strategic planning framework within which to construct a plan. Within
273 this framework, the Committee considered a multitude of interconnected economic, social and
274 environmental factors. Given the time and resources available, the Committee focused on the impacts
275 of withdrawing water from the Mahomet Aquifer System and the major river basins to meet water
276 demand scenarios to 2050.

277
278 The Committee has identified a set of guidelines for regional water supply planning and
279 management based on the following six foundations:

280
281 **Self governance;** **Adaptive management;** **Shared responsibilities;**
282 **Sustainable water supplies;** **Sound science;** **Informed public.**

284 The sustainability of water supplies is defined as the provision of dependable and adequate supplies
285 of clean water to meet the demands of all users in a manner that can be maintained for an indefinite
286 time without causing unacceptable environmental, economic, or social costs.

287
288

289 KEY COMPONENTS

290
291
292

291 Vision of the future

293

293 In the years ahead, others will view East-Central Illinois as a model for regional water supply
294 planning and management. This is because future generations will inherit a legacy of responsible water
295 supply planning and management that will allow them to continue to be good stewards and managers,
296 rather than inheriting diminished resources and chronic problems. The provision of dependable and
297 adequate supplies of clean water for all users at reasonable economic and environmental cost will
298 enhance public health and the quality of life, reduce conflict, and preserve and enhance economic,
299 agricultural and environmental resources and opportunities.

300
301

302 Goal

303
304

304 The goal is to make recommendations that will be adopted and implemented by stakeholders to
305 improve the planning and management of water supplies in East-Central Illinois.

306
307

308 Planning and management standards

309
310

310 In order to protect aquifers, surface waters and ecosystems while allowing for the development of
311 water resources, the Committee recommends a number of voluntary standards for water supply
312 planning and management.

313

- 314 • Water supplies should continue to be planned and managed to meet demand in compliance
315 with existing laws, regulations and property rights, with due determination and
316 consideration of acceptable and/or unacceptable impacts.
- 317
318 • Water supplies should be planned and managed with enhanced regional cooperation and
319 coordination to address shared responsibilities and the interests of future generations.
320 Enhanced regional cooperation and coordination should be achieved through voluntary
321 efforts in the spirit of self-governance.
- 322
323 • Withdrawals from the confined Mahomet Aquifer should be managed so that head in any
324 well (pumping or non-pumping) finished in the confined Mahomet Aquifer does not fall
325 below the top of the aquifer. i.e., there is no loss of saturated thickness. It will be important
326 to monitor heads in pumping and non-pumping wells and provide a water-level watch for all
327 stakeholders.
- 328
329 • The earlier evaluation of the sustainability of pumping to capacity by Illinois American Water
330 (51.1 million gallons per day (mgd)) should be reevaluated to include additional withdrawals

- 331 from the Mahomet Aquifer by other communities and industries out to 2050, with
332 consideration of drawdown in pumping and non-pumping wells.
333
- 334 • The transition zone between the confined and unconfined parts of the Mahomet Aquifer
335 should be defined and an appropriate standard(s) be developed to protect the aquifer,
336 surface waters and ecosystems, while allowing for groundwater development.
337
 - 338 • A standard(s) should be set to protect shallow confined aquifers, surface waters and
339 ecosystems, while allowing for groundwater development.
340
 - 341 • In the unconfined parts of the Mahomet Aquifer in the Havana Lowlands, a standard(s)
342 should be developed and implemented to limit the reduction of saturated thickness in the
343 unconfined aquifer and protect surface waters and ecosystems, especially in summer during
344 drought conditions, while allowing for groundwater development.
345
 - 346 • The Committee recommends that key aquifer recharge areas, key stream reaches, and
347 ecosystem-sensitive stream flows be identified and preserved and/or restored.
348
 - 349 • Water supply facilities should be designed, constructed and operated in a manner that
350 prevents unacceptable impacts to surface waters, including streamflow and water levels in
351 lakes, wetlands and aquatic and riparian ecosystems, while providing sufficient water to
352 meet demand. Unacceptable impacts need to be defined.
353
 - 354 • Criteria and standards to protect the aquifers should be reevaluated when criteria and a
355 standard(s) are developed to protect surface waters and aquatic and riparian ecosystems
356 from possible unacceptable impacts of groundwater withdrawals, once unacceptable
357 impacts are defined.
358
 - 359 • Public water supplies should be managed to provide dependable and adequate supplies of
360 water during, at a minimum, recurrence of the multi-year droughts-of-record similar to
361 those that occurred in the 1930s and 1950s. A 90 percent confidence level should be used
362 for yields. Bloomington, Decatur and Springfield urgently need additional sources of water
363 and/or need to reduce water demand to be able to provide adequate supplies of water
364 during a drought-of-record, which can recur at any time. Emergency response plans for all
365 water supply facilities should be updated or prepared to provide adequate supplies of water
366 in low-probability situations in which adequate water supplies cannot be provided through
367 normal operations and capacities.
368
 - 369 • Efficiencies of water withdrawal, treatment, distribution and use, and use of water from
370 alternative sources (such as reused water, detained stormwater, and conjunctive use of
371 surface water and groundwater) should be increased. This should include obtaining
372 maximum feasible efficiencies in all existing, committed and planned water supply facilities,
373 which should be supplemented with additional facilities only as necessary to serve
374 anticipated water supply needs. Identification and uniform implementation of best
375 management practices for water supply facilities, where feasible, will help minimize the sum
376 of water supply system operating and capital investment costs and increase water use

377 efficiencies and sustainability. Examination of water pricing policies and practices may lead
378 to identification of additional strategies to reduce water demand.

- 379
- 380 • Water supply facilities should be designed for staged or incremental construction, where
381 feasible, to permit maximum flexibility to accommodate changes in population and
382 economic growth, changes in technology for water supply management, new scientific
383 understanding, and possible new or revised management standards.
 - 384
 - 385 • A continuous process for water supply planning should be implemented and regional and
386 local water supply plans should be reviewed and updated at least every five years.
 - 387
 - 388 • All water supply managers and other stakeholders in the region should be encouraged to
389 review a regional plan, suggest modifications, and become partners in regional water supply
390 planning and management.
 - 391
 - 392

393 **ACTION ITEMS**

394

395 **The main recommendation is to establish a permanent process and structure for regional water**
396 **supply planning and management involving a diverse set of stakeholders.**

397

398 **The Committee recommends that the Mahomet Aquifer Consortium retool to provide leadership,**
399 **administrative structure and process to fulfill an expanded role for regional water supply planning and**
400 **management in East-Central Illinois.**

- 401
- 402 • The mission should be broadened to include leadership and coordination of regional water
403 supply planning and management activities – for surface water as well as groundwater – in the
404 15-county region.
- 405
- 406 • Membership of the Board of Directors and its Technical Advisors should be broadened to
407 include the type of stakeholder and geographical diversity represented on the Regional Water
408 Supply Planning Committee.
- 409
- 410 • The Mahomet Aquifer Consortium should establish a continuous process and structure for
411 regional water supply planning and management to implement a regional plan, including an
412 appropriate committee structure.
- 413
- 414 • Engage in a continuous process of regional water supply planning and management and
415 implement a regional plan.
- 416
- 417 • Broader participation in Members’ meetings should be encouraged and meetings rotated
418 throughout the region.
- 419
- 420 • To be effective, the Mahomet Aquifer Consortium will need a permanent staff and appropriate
421 financial and operating resources.
- 422

423 While encouraging the Mahomet Aquifer Consortium to identify its own means to implement the
424 regional plan, the Committee recommends two strategies to the Mahomet Aquifer Consortium, the
425 Illinois Department of Natural Resources, and the University of Illinois at Urbana-Champaign.

- 426
- 427 • As a critical early step, the Mahomet Aquifer Consortium is encouraged to identify its resource
428 needs and to take action to secure them. Stable and adequate funding from state government
429 and local entities is needed to support efforts to implement the regional plan. Federal funds also
430 should be pursued as a possible source.
- 431
- 432 • The University of Illinois at Urbana-Champaign is encouraged to consolidate and strengthen its
433 important role as a partner in regional water supply planning and management.
- 434
- 435

436 KEY FINDINGS

- 437
- 438 • Demand for water and water withdrawals will increase. Using different combinations of
439 assumptions, a plausible range of increases in total surface water and groundwater withdrawals
440 in the region by 2050 (excluding electric power generation) is about 220 to 420 mgd more than
441 modeled, normal-weather withdrawals of about 340 mgd in 2005. This range of increase would
442 be about 100 to 300 mgd above 2005 reported and estimated withdrawals of about 460 mgd,
443 which was a drought year in parts of the region. Withdrawals for electric power generation (the
444 large majority of which are non-consumptive) could decrease by 7 percent to about 1,218 mgd
445 or increase by 2 percent to about 1,342 mgd.
- 446
- 447 • Under normal weather conditions, groundwater withdrawals from the Mahomet Aquifer are
448 reported to increase from about 220 mgd in 2005 to 260 mgd in the Less Resource Intensive
449 (LRI) scenario in 2050, 280 mgd in the Baseline (BL) scenario, and 300 mgd in the More Resource
450 Intensive (MRI) scenario. Withdrawals would be much higher in a drought year, especially for
451 irrigation, and would increase with some climate change scenarios.
- 452
- 453 • An extreme climate scenario for water supplies would be a decrease in mean annual
454 precipitation, a recurrence of severe multi-year droughts, and an increase in temperature. The
455 probability of such a scenario occurring is unknown. However, severe multi-year droughts are
456 likely to recur and pose a great threat to water availability and some water supplies in the
457 region, especially those from surface waters and shallow aquifers. Building capacity to be
458 prepared for severe multi-year droughts also would provide protection against the adverse
459 impacts of possible climate change.
- 460
- 461 • Even during periods of drought and with possible climate change, there is sufficient water in the
462 region to meet the future water demand scenarios considered, provided that adequate
463 infrastructure and drought preparedness plans are developed and implemented and economic
464 and environmental costs can be tolerated.
- 465
- 466 • Withdrawing water from rivers and aquifers, storing, treating, distributing water, and
467 discharging waste water have social and economic benefits and economic and environmental

468 costs. Determining how much water is to be withdrawn from different sources necessitates
469 balancing and weighing benefits against costs and risks.

- 470
- 471 • Reservoirs are the prime sources of water supply for Decatur, Danville, Springfield and
472 Bloomington. Bloomington’s current use is about 12 mgd and the 90 percent estimate of yield
473 in a drought-of-record is 11.0 mgd. Decatur currently uses about 37 mgd and the 90 percent
474 yield estimate is 34.6 mgd. Springfield uses about 32 mgd and its 90 percent yield estimate is
475 23.4 mgd. Due to increasing water demand and increasing sedimentation, all three cities will
476 have increasing water supply deficits in the future unless additional sources of supply are
477 developed and/or demand is reduced. By 2050, Danville will have a water supply deficit with the
478 Baseline water demand scenario and a greater deficit with the More Resource Intensive water
479 demand scenario.
 - 480
 - 481 • Withdrawing sufficient water from aquifers to meet demands to 2050 results in increasing
482 drawdown of heads in wells finished in the aquifers, expanding cones of depression, a reversal
483 of groundwater flow in some areas, and reduced baseflow in streams. The bull’s eye of concern
484 is in Champaign County, where drawdown could lower head in some wells to less than 50 feet
485 above the top of the Mahomet Aquifer in some scenarios. Some shallow aquifers increasingly
486 are dewatered locally, wells finished in these aquifers go dry, and water levels in other wells
487 drop below the pumps and will require pumps to be lowered to sustain yields.
 - 488
 - 489 • The possibility of a slight increase in water withdrawals for electric power generation does not
490 appear to create a problem, although projections of future electricity demand and associated
491 water withdrawals are highly uncertain.
 - 492
 - 493 • The concept of the sustainability of water supplies is not uniformly or comprehensively
494 integrated in water supply management plans in the region.
 - 495
 - 496 • Water supplies in East-Central Illinois are planned and managed largely in piecemeal manner by
497 individual managers and local and sub-regional authorities. There is no planning and
498 management process or structure for comprehensive water supply planning and management
499 across the region.
 - 500
 - 501 • The University of Illinois at Urbana-Champaign, through the Illinois State Water Survey, Illinois
502 State Geological Survey and other departments, provides valuable technical assistance for water
503 supply planning and management
 - 504
 - 505 • The public and many local decision makers have limited understanding of water supply issues
506 and often are misinformed.

507

508 Based on the above findings, the Committee concludes that improvements in regional water supply
509 planning and management are needed to continue to provide benefits and to reduce costs and risks for
510 current and future residents of East-Central Illinois, those outside the region who depend on goods and
511 services produced in the region, and the environment.

515 **CONCLUSIONS**

516

517 Many of the building blocks of sound water supply planning and management already are in place.
518 We need to strengthen the blocks, add a few new ones, and reinforce the cement between the blocks.
519 Adding planning and management at the regional level is the cement that can improve communication
520 and coordination among stakeholders. The Committee recommends to today’s stakeholders a regional
521 water supply plan that will allow them to realize the potentials of the water resources in the region,
522 shape their own future, and provide a worthy inheritance for future generations.

523

524 In the absence of improved water supply planning and management, the Committee believes that
525 future generations in the region face increased threats of water conflicts, crisis management,
526 degradation of the environment, and threats to public welfare and economic development. These
527 threats can be avoided or minimized by implementing the recommended regional plan.

528

529 The Foreword to the 1967 state water plan began with the assertive statement that “Illinois must
530 plan the long-range development of its water resources, if the state is to meet the needs of the future.”
531 Forty two years later, that challenge remains.

532

533 A plan with no new laws or regulations and voluntary participation is perhaps more challenging to
534 implement than having to comply with new laws or regulations. Self-governance requires stakeholders’
535 participation and all to maintain open-minded, informed, just views of our personal, community and
536 common welfare.

