CHAPTER SEVEN: STEP TWO - INVENTORYING AND FORECASTING RESOURCES

Future, *n*. That period of time in which our affairs prosper, our friends are true and our happiness is assured. Ambrose Bierce, *The Devil's Dictionary*.

Step Two: "Inventory, forecast, and analysis of water and related land resource conditions within the planning area relevant to the identified problems and opportunities." (P&G Standards Section III paragraph 1.3.2 (a)(2))

INTRODUCTION

Information gathering is one of the principal tasks of any planning effort. Information is needed to identify and quantify problems and opportunities. It's needed to measure plan effects. *Information is essential to making good decisions*.

Information gathering is divided into two basic types by the P&G: **inventory** and **forecast**. Gathering existing information, current and historical, is the inventory type of data collection. Gathering information that describes potential future conditions is the forecast type of information gathering.

Information is data put to purposeful use.

Information gathering is distinguished from data gathering by the quality of its content. For present purposes, data are considered to be facts or figures from which conclusions can be inferred. Information implies that data have been considered, and conclusions useful to the planning process have been inferred. Information is data put to purposeful use.

Information is used to define relevant conditions in the planning area under various scenarios. These conditions include **historic conditions**, **existing conditions**, **base year conditions**, **most likely future conditions without a project**, and **most likely future conditions with a project**. The last three of these are forecasts of conditions. Differences among these various conditions are evaluated and compared, and provide a major basis for plan selection.

The gathering of useful information almost certainly will have begun long before the planning effort. It will continue throughout the planning effort. Last-minute revisions to relevant information have both vexed and saved many planning efforts. Information gathering is one of the planning steps that is continued relentlessly, although not necessarily by the planning team, even after the planning study is completed.

With and Without is not Before and After

"Before storm protection was built in the coastal town of Amity in 1960 there was little economic activity. Now there is a $1 billion tourist industry," says the mayor in a tribute to the artificial dunes. The implication is clear. The dunes have caused a tremendous economic growth. But did they?

Suppose the mayor forgot to mention that a bridge replaced the five-car ferry in 1965. Population within two-hours of the town has more than doubled and personal income has tripled. In addition, a very successful advertising campaign attracts visitors from 15 states. Would it still be fair to attribute the economic growth to the dunes? These other changes would have taken place anyway.

The mayor provides an example of a before and after analysis that measures a variable, economic activity, at one point in time and again at a later point in time. There is no cause and effect analysis. A without- and with-project condition introduces cause and effect analysis to these comparisons over time.

Information gathering is usually the most time-consuming and expensive part of the planning process.

This chapter explores the dimensions of information gathering. It begins by defining the scenarios that plans require information to describe. From there it proceeds to a consideration of some of the types of data that may be collected to describe the scenarios and to complete the study.

PLANNING CONDITIONS

To choose the best course of action from among the alternatives available to us, we need to know what difference any given course of action will make. A "difference" implies that some sort of comparison has been made. A future oriented activity like planning requires the comparison of different conditions at different points in time. Let's begin by considering the different points in time that might be of interest.

The past may be very important to planners. *It is not easy to understand the present without some knowledge of the past*. Your present standard of living is important information. Considered in the context of your past standards of living, however, the same information about your current situation is far richer. With past information, we know whether your standard of living is rising or falling. When a scenario describing past conditions is required for a study, it is called the **historic condition**. Because there is the possibility for one or more historic conditions, ten years ago, 50 years ago and so on, it is necessary to adequately described the context and purpose of the historic condition described in a study.

Conditions that exist at the time of the study are collectively called the **existing condition**. Try to avoid getting too literal in the definition of this scenario. Reasonable accuracy is more important than literal truth. You may have to rely on average conditions in recent years rather than precise data for the year of the study. There is nothing wrong with that if the average reasonably represents the relevant study area conditions. The existing condition is sometimes called the **base condition**, or **current condition**.

Unless these data become information…time and money were wasted in collecting them and they simply take up space in the report.

Because plans take time to implement, it is quite possible that planning area conditions will be different at the time the project is finally operational from what they are under the existing condition scenario. When this is the case, the most likely future condition at the time the project is operational is called the **base year condition**, not to be confused with the base condition. The base year condition is a short-run future forecast that is generally a without- project condition forecast, but it can be a with-project condition forecast at times. *The base year condition is often important in the determination of the time value of benefits and costs*. For a more detailed discussion of these issues, see the National Economic Development Procedures Manual. - National Economic Development Costs, IWR Report 93-R-12.

When describing future conditions in a planning area, planners are guessing. At best, these guesses are reasoned, scientific forecasts based on experience, good data, and the best appropriate forecasting methods. At worst, they are only guesses. Thus, it is important to recognize from the outset that forecasts of future conditions are fundamentally uncertain. To present them as deterministic or anything more than the best guess possible would be misleading to decision-makers and the public.

Given the many ways the future could turn out, it is the planners' task to identify the **most likely future condition** or the **most probable future**. There may be times when it is not honestly possible to identify one future condition as more likely than another. If plan selection would be affected by the choice of the alternative future, it is advisable to present the different alternative future scenarios. When different futures are possible but none make a material difference to the decision-making process, then a single most likely future condition can be identified. When there is good reason to believe that one alternative future is indeed more likely than any of the others, it is sufficient to identify that one as the most likely alternative future.

Table 20: Planning Scenarios

WAS - historic condition
IS - existing condition
WILL BE - most probable future. . .
. . .base year condition
. . .without condition
. . .with condition

Two important most probable future condition scenarios are the most probable future without a project and the most probable future with a project. To avoid this unwieldy terminology, these are commonly called the **without condition** (or **without-project condition**) and the **with condition** (or **with-project condition**). The structure of these scenarios is summarized in Table 20.

The without-project condition describes the condition that is expected to prevail in the planning area in the future if the **no-action alternative** is selected as the best thing to do.

Condition Scenarios

Suppose there is a conveniently rectangular bird island; 43,560 feet long and 100 feet wide, a total of 100 acres in size, in 1996. Further suppose the island has been eroding one foot in width each year and a nourishment plan that could be operational by 2000 would widen the island to 150 feet but would have no effect on the erosion rate. Let's consider the size of the bird island under the various scenarios planners encounter.

	Historic 1990	Existing 1996	W/O Base Year 2000	W/Base Year 2000	W/O 2010	W/ 2010
Area in Acres	106	100	96	150	86	140

In 1990 there were 106 acres but there are only 100 today. If nothing is done there would only be 96 acres in the base year, 2000. By the year 2010 the island would be down to 86 acres. However, if the island is restored to 150 acres in 2000 there will be 140 acres ten years later.

What are the impacts of the plan? The answer depends on our temporal frame of reference. In the year 2000 there would be 150 acres rather than 96, a net gain of 54 acres. In 2010 there would still be a net gain of 54 acres, due to the simplicity of our the example. Thus, in this example, the project produces the annual equivalent of an additional 54 acres of bird island.

The appropriate way to identify plan impacts is to compare future conditions with the plan (140 acres in 2010) to future conditions without the plan (86 acres in 2010). The appropriate comparison is not a before (100 acres in 1996) and after (140 acres in 2010) comparison. Corps planning uses without and with condition comparisons, not before-and-after comparisons, in the evaluation of plan effects.

In other words, *the without project condition describes the project area's future if there is no Federal action taken to solve the problem at hand*. There will ordinarily be one without-project condition for the planning area. *Every alternative plan is compared to the same without-project condition*. The exception would be when it is not possible to single out one future scenario as most likely. In such a case, each alternative plan must be compared to each without-project condition.

...each plan will lead to a different with project condition.

The with-project condition describes the condition that is expected to prevail in the planning area in the future

Information: Existing and Future

Suppose one objective is to reduce flood damages in the Minion Creek Township. What might you need to do that? First, keep in mind this is a planning objective and at this step in the planning process we have two tasks. First, we need to establish the nature of the existing flood problem. That will require existing hydrology and hydraulics as well as information about the potential damages in the flood plain.

Second, we need to establish a most likely future scenario if we do not implement any plans. That will require an analysis of future hydrology, hydraulics, and floodplain development. It would also have to include consideration of any potential activities that might be taken by others to lessen flood damages in the future without a plan.

If another objective is to preserve wetlands in the area, this will require additional information. Although hydrologic requirements might overlap the two objectives, it will be necessary to document the amount and quality of existing wetlands. In addition, it will be important to identify activities that could either diminish or increase these resources in the future.

What about the information you need to determine how much flood damage each alternative plan reduces or increases and how much wetland they affect? These kinds of information are gathered in much the same way.

if a particular plan is implemented. There could be more than one with project condition if it is not possible to single out one future scenario as most likely. However, each plan will lead to a different with-project condition. If two plans result in exactly the same future condition scenario, they would have to be identical in their impacts, and that implies they may be one and the same plan.

How long is the forecast period? That depends on the nature of the project. Generally, forecasts are expected to coincide with the project life. However, there are often circumstances in which it may be appropriate to forecast future conditions over a period of time less than the project life. For example, it is common practice in navigation studies to forecast commodity movements over 10 or 20 years, assuming no changes after that. This is done in simple recognition of the fact that these forecasts are so uncertain that they have little credibility when extended beyond 20 years.

Forecast values may be expressed in average annual equivalent units, as project benefits and costs are; or they may be expressed at select points in time, usually at fixed intervals after the base year. For example, the preceding sidebar presents impacts at project year 10 (2010), 10 years after the base year.

WHAT KINDS OF INFORMATION ARE NEEDED?

What kinds of information do planners need to develop these scenarios? Specific types of information required will vary with the type of study and the resources available. The information has to describe the existing, without-project, and with-project conditions adequately enough for decision-making. *Three important generic types of*

information can be identified for any planning effort.

First, information is needed to identify and adequately describe the problems and opportunities of the study area. For example, a flood damage reduction study will require hydrologic and hydraulic data, as well as stage-damage relationships for each reach. Navigation studies will need to know channel depths and channel usage. These data will be required for the existing and without-project conditions just to quantify the nature and extent of the problem. They are also the evidence that supports your planning objectives and constraints.

An ecosystem restoration study might require information about the historic condition to establish the extent of degradation and the level of restoration possible. It would also require information needed to describe existing and future without project conditions.

Second, information is needed to estimate life cycle project costs. These include firsts costs of construction as well as all operation, maintenance, major rehabilitation, and other relevant costs.

Third, information is needed to describe important project effects. Some of the impacts are related to the planning objectives and constraints of the study. Certain kinds of information will be needed to measure objective attainment and constraint avoidance for the alternative considered. The planning objectives and constraints should guide much of the information collection. Identification of some impacts is required by law. For example, Federal laws require effects on significant cultural resources, endangered species and other impacts be considered. A third category of impacts comprises other things of specific interest to the planning partners, i.e., Federal and non-Federal interests.

The Value of Information

Which is the more horrible fate: paralysis by analysis or extinction by instinct? These choices reflect one of the more difficult decisions a planner faces in this step of the planning process. How much information is enough?

Having more information may reduce your anxiety. Unless it changes your decision, it is not worth the cost of obtaining it. An important question to ask when considering what information to gather or how much more of it to get is, "Could this information affect your decision?" If the answer is no, do not get it. If the answer is yes, it's necessary to ask how likely it is to change your decision. If the possibility is remote, do not get the information unless the potential change is significant.

Information for these purposes must be of sufficient quantity and quality to convincingly, not necessarily perfectly, answer the questions: What are the

problems/opportunities? What are the costs of the alternatives? What are the impacts of a plan we're legally required to address? How do the plans contribute to the planning objectives and constraints? How do the plans affect the significant interests of the partners?

"Planner as storyteller" is an appropriate role to assume when thinking about the information you will need. The planning process is a simple adaptation of the scientific process. It is a rational approach to problem solving and decision-making. It's done all the time. What kind of information will you need to tell a convincing story about why you made the decisions you made? If you cannot tell a complete, logical, and easy-to-follow story about what you did, bolstered and supported with the information necessary to do so, then you cannot plan.

If you cannot tell a complete, logical and easy-to-follow story about what you did…then you cannot plan.

As the planning process develops, a story does unfold. That is the story you are going to have to be able to tell convincingly, if stakeholders are to be convinced of the soundness of your decision and the rationality of the process by which you arrived at it. Because you need to guess at the information you'll need at the end from the very beginning, it is inevitable that you'll gather some information that is ultimately not useful (then don't use it!). Likewise, you'll find yourself needing information you don't have (then go get it or work around it the best you can). Revising information needs as your understanding of the problems and opportunities evolves and as planning objectives are refined and the story develops is a constant in every planning study. The following section suggests four parameters of data collection worth considering in this information gathering and management step of the planning process.

FOUR PARAMETERS OF DATA COLLECTION

The four parameters of data collection are **quantity, quality, timing** *and* **location**. How much information is enough? How accurate and how representative must the data be? At what point does the collection process start, how long do you have to collect information, and for what period of time are data required? What geographic area is to be covered? As the study begins, you'll have a preliminary response to these questions. The definitive answer to these questions won't be known until the end of the study. Like virtually everything else in the study process, data collection is an iterative process.

Quantity. Table 21 lists some generic types of data that might be useful for planning. The data types are divided into two broad categories. The first includes **physical data**. These are the data that depend only on the existing physical environment. The second type, socioeconomic data, includes those data that depend on the human element in the environment. You need enough data of sufficient quality to be reasonably certain you have the information you need to move forward in the decision process.

Could the expected annual damage estimates be better? The answer is almost always going to be yes. If you broke the study area into more reaches; had more stream record; used a larger sample of structures; developed site-specific stage-damage curves;

Table 21: Selected Data for Planning

I. Physical
- A. Geology
  1. Formations
  2. Foundation characteristics
  3. Minerals
- B. Land Resources
  1. Soil survey (land classification)
  2. Development
  3. Drainage
- C. Hydrogeology (Groundwater)
  1. Aquifer characteristics
  2. Yields
  3. GW elevations (records)
- D. Physical Geography
  1. Maps
  2. Aerial photographs
  3. Infrastructure (cities, roads, etc.)
- E. Meteorology
  1. Rain gages
  2. Precipitation records
  3. Evaporation and evapotranspiration
- F. Hydrology
  1. Gaging stations, location
  2. Stream flow records
  3. Watershed characteristics
- G. Water Quality
  1. Groundwater and surface water quality
  2. Sensitive areas
  3. Sediment loads
- H. Environment (Ecology)
  1. Flora and fauna
  2. Sensitive areas and significant resources
  3. Air, land, water pollution

II. Socioeconomic
- A. Institutions
  1. Water-related
  2. Political
  3. Regulatory
- B. Demographic
  1. Population (existing & future)
  2. Population characteristics
  3. Location of population
- C. Geographical, Social
  1. Land use (existing & future)
  2. Values and elevations
  3. Zoning
- D. Economic
  1. Markets
  2. Income Distribution/ Employment
  3. Benefits and cost estimates
- E. Financial
  1. Sources of funds
  2. Types of repayment
  3. Cost-sharing and allocation
- F. Legal
  1. Water law
  2. Environmental laws
  3. Agreements, treaties, constraints
- G. Social Publics
  1. Stakeholders
  2. Silent majority
  3. Information to be diseminated
- H. Other Sectors/Functions
  1. Agencies for coordination
  2. Plans (cooperation)
- I. Recreational Needs

Source: Adapted from Helweg, Otto J., *Water Resources Planning and Management*

and so on, the examples would probably be better. But, have youu used reasonable data collection and analytical methods to obtain the informationyou need to feel

reasonably comfortable that you now understand the magnitude of the flood problem as described by expected annual damages?

If you do, you have enough information and it is time to move on. If team members have serious doubts about the quality of the information you're working with, these information gaps need to be further addressed.

Quality. The quality of data depends primarily on the stage and type of the study. For a "continuing authority" project, a visual inspection of a stream may be adequate. For a feasibility study, the stream may need to be gaged. Data should be **homogeneous**, i.e., they must measure one thing consistently. They should also be **representative**. If you're using **sample data**, it should be an **unbiased sample** from the population of interest. For example, a short stream record taken during unusually wet years would not be representative of the long-term stream flows. **Accuracy** is a fundamental aspect of data quality. The accuracy of your data must be known and communicated in the report.

Timing. There are two dimensions to the timing characteristic of data collection. First, is time as it relates to the planner. *When can data collection begin and how long do you have to complete the study*? These dates and periods vary with the type and stage of study. Every question has the one hour answer, the one day answer, the one week answer, etc. The length of time allowed to gather information depends on the importance of the information.

Every question has the one hour answer, the one day answer, the one week answer, etc.

The second dimension is time as it relates to the data themselves. The dates on which data were collected may be important. Streamflow or water quality data collected during a drought may differ substantially from normal data. Economic surveys conducted during recessions will differ from those collected during economic booms. Another aspect of data timing is the length of the data record. This is especially important for hydrology and monitoring the health of ecosystems. The timing of monetary values is important in terms of the time value of money and the price level used to measure monetary values.

Location. The geographic area for which data are collected will usually conform to the planning area. Normally data will not be collected for areas outside the affected area unless the outside data affect the study or are needed to provide perspective and context for the study area data.

The section that follows presents some ideas to consider for developing an information-gathering strategy. When planning to collect data to provide the information necessary for good decision-making, planners must be cognizant of the quantity, quality, timing, and spatial dimensions of their data collection efforts.

PREPARING AN INFORMATION STRATEGY

If you have prepared a problem statement and a list of planning objectives, then you have an invaluable input for determining your information needs. Beneath each statement of a problem, list the types of information you'll need to describe the problem. Beneath each objective list, the information you'll need to see if you are contributing to that objective. Then, you can list the types of data you are going to need to provide the information you require.

Table 22 provides an example of how this information strategy might be arranged. The numbered items indicate the basic information sought. The lettered items identify data that will help provide that information. Obviously, the analysts can provide as much detail as is required or desired in describing the information needed and the data that will provide that information. An **information gathering strategy** like this can be prepared for each problem, opportunity, planning objective, and constraint. In subsequent steps, as alternative plans are identified, additional information may be required for evaluating, appraising and comparing plan impacts. However, if you do a good job in this step, most of those data will already be available.

Table 22: Information-Gathering Strategy

Problem 1: Flood damages from Minion Creek

Information Needs:

1. Definition/extent of flood plain
    a. Topographic maps: obtain existing aerials
    b. Hydrology - existing & future: USGS gage data
    c. Hydraulics - existing & future: field surveys
2. Property at risk of flooding
    a. Property survey - existing & future: field surveys
    b. Appraise value of property: Marshall-Swift
    c. Depth-damage curves: site-specific curves
3. Expected annual damage estimates - existing & future
    a. Frequency curve: H&H section
    b: Rating curve: H&H section
    c. Damage curve: Economics Branch
    d. Estimating algorithm or computer program: risk-based EAD calculations
4. Likelihood of restoration of natural flood plain values
    a. Residents views on evacuation: public involvement
    b. Environmental resources restored: expert opinion
    c. Political support: study coordination

In many cases, planners begin by collecting the same data that was collected for another district study. Planners who collect information in this fashion run the risk of wasting scarce study resources collecting data that are not going to provide useful or necessary information in their own study. More importantly, they may overlooknecessary data and information unique to their own situation. The amount and types of information that can be gathered are virtually limitless, but not all of that information is going to be of equal value in decision-making. *The cardinal rule for information-gathering is to get what you need to make good decisions, not what is available or traditionally gathered.*

Table 23: General Sources of Data

Internal secondary sources
External secondary sources
Internal primary sources
External primary sources

Once the data needs for each problem, opportunity, planning objective and constraint have been tentatively identified as described above, the planner needs a strategy for obtaining the data and information. This activity begins by identifying general sources of information as shown in Table 23.

Internal data are, or have been, produced by study participants. What data do the Corps and its non-Federal partner(s) have? **External data** are data produced by institutions, agencies, individuals, and organizations that are not study participants. What data have already been collected by other agencies, academic institutions, researchers, consultants, and so on?

Let the Planner Beware

The without-project condition makes it possible to describe what society is going to have to give up in order to gain the outputs of an alternative plan. In order to properly describe what is going to be lost, it is important that the existing condition and forecasts include all resources of significance. If problems, opportunities, planning objectives and constraints are properly identified and scoping is completed, this should ensure that all resources of importance are included. However, planners should review the planning area to ensure this has been done.

For example, suppose a study area has some bottom land hardwoods and wetlands. Inexperienced planners might fail to realize the plan has an opportunity to preserve these valuable resources, in which case they could be overlooked in the information-gathering steps. Thus, we offer as a caveat the admonishment that if you have significant resources in a planning area that do not show up in a problem or opportunity statement, or that are not mentioned in a planning objective or constraint, you need to reconsider your step one activities; you may have missed an opportunity.

Primary data are obtained from original research. An example of external primary data would be stream gage data collected by the U.S. Geologic Survey. Internal primary data would include things like original surveys of foundation conditions, channel depths, damage potential, and the like. **Secondary data** have already been gathered for some other purpose. External secondary data would include the data compiled in reports like the Statistical Abstract of the United States. Internal secondary data would include information from previous studies.

The information-gathering strategy can be expanded as shown in Table 22 to indicate the general source of the data. In a feasibility study, this entire step is nothing more than an update and more specific iteration of the work that was done in the preparation of the Project Study Plan.

Future External Environment

What is going to happen to that tidal wetland if we do not implement a plan? Will it be developed for condominiums and a shopping center or will it be protected from such uses? That depends on many things. If we can show these wetlands were going to disappear anyway, then there is not a significant impact if one of our alternatives would cause their loss, is there?

If there are no legislative restrictions, the future of the wetlands may depend on the state of the economy in this area and on population growth, which may in turn depend on the quality of life in the area. Perhaps if the education system is not improved in this county, people will continue to try to escape the poverty that results, and the land will never develop anyway.

Suppose there is national legislation that prohibits the development of tidal wetlands. Suppose even in the absence of national legislation, we see this state moving toward a more environmentally friendly stance. There could be many factors well beyond the partnership's control that would affect our forecasts of future conditions without a plan. It is the planner's job to consider them adequately and as objectively as possible.

What Types of Information Are Typically Needed?

There are many lists of specific data types or sources that might contain the information needed to conduct a successful study. They can generally be found in guidance and the professional literature. The NED benefit procedures manuals produced by the Institute for Water Resources, and the Corps' ECs and ERs are excellent sources of such lists. Those interested in lists of representative or essential information types are advised to review the more detailed guidance. We avoid the lists here because there is no such thing as a typical study and no set of lists would be complete. Each planning effort involves unique circumstances and wicked problems. Hence, a unique information gathering strategy is needed for each study.

FORECASTING FOR THE EXTERNAL AND INTERNAL ENVIRONMENTS

Many factors that affect a plan are external to the planning process. These are the things that cannot be controlled or influenced by the planning process. They include economic, governmental, political, social, natural and technological factors or trends that are beyond the influence of the planning process, but that might influence the planning area directly or indirectly, now or in the future.

There are also internal factors, elements, and systems that exist within the sphere of influence of the partnership. These would include all the institutional elements and systems of the partners themselves, plus those factors of the planning area that can be affected and influenced by alternative plans.

EXTERNAL ENVIRONMENT

The **external environment** is sometimes called the **macroenvironment** by private sector firms engaged in strategic planning. It is important to think about macroenvironmental factors when determining what information is going to be needed to inventory and forecast resources for your study. Table 24 provides some examples of these factors.

Table 24: Examples of Macroenvironmental Factors

- Economic
  - Business cycle
  - Money supply
  - GNP trends
  - Inflation
  - Interest rates
  - Exchange rates
  - Unemployment
  - Balance of trade
- Government & Politics
  - Environmental laws
  - Attitudes toward govt.
  - Tax laws
  - Stability
  - Trade policies
  - Alliances
  - Wars & conflicts
  - Election results
- Societal
  - Quality of life attitudes
  - Lifestyles
  - Career expectations
  - Population growth
  - Crime
  - Education trends
- Natural
  - Pollution
  - Climate change
  - Resource reserves
- Technological
  - R&D spending
  - New products
  - Technology transfer
  - Automation & Robotics
  - Patent laws
  - Spread of technology

The fall of communism provides a dramatic example of an external event that has had enormous implications for the world. During step two, planners should be scanning the horizons of the future looking for the dramatic changes that could affect their plans. They need not be "fall of communism" magnitude, but no reasonably foreseeable significant change should be overlooked.

In order to define a good without-project condition, planners must develop some facility in looking into the future. Deep draft navigation has to be concerned about future trade patterns, trends in energy prices, and the like. These are factors

clearly beyond the control of planners, but they are factors of importance to planners. The fall of communism will open markets formerly closed to U.S. commerce. What will this mean for commodity forecasts and future tonnage? If relations between the U.S. and Cuba are normalized, what will this mean for ports in south Florida?

These are the types of questions with important implications for projects of which planners have to be aware. A major purpose for considering these external or macroenvironmental factors is to try to identify trends, factors, and events that could affect plan outcomes in a significant fashion. In many cases, this kind of information will be incomplete and speculative. In such cases, it may be prudent to define more than one without-project condition. For example, a south Florida port project may be well advised to have a without-project condition that includes a "closed Cuba" scenario and another with an "open Cuba" scenario because project benefits may vary greatly between the two scenarios. The choice of the most likely scenario will depend greatly on information gathered during this step of the planning process.

A common error in forecasting future scenarios is failure to consider foreseeable changes and trends in the macroenvironment. It's the planner's job to identify any future events that could significantly alter the outcomes of a plan, to the extent possible, and to give them appropriate and explicit consideration. A common characteristic of particularly good plans is that ability to consider important things that are not so easy to foresee.

INTERNAL ENVIRONMENT

The **internal environment** is what is commonly considered within the domain of a Corps study. Here, we use the term internal to mean internal to the study process. This information includes the hydrologic, hydraulic, environmental, economic, engineering, and other data and information that are the bread and butter of a Corps study. These are the kinds of data primarily referred to in the information strategy example above. These data will always be critical to Corps studies. Enough has been said about them in other Corps guidance, however, and they are not addressed further here.

RECOGNIZE THE UNCERTAINTY IN WHAT YOU ARE DOING

A little humility will go a long way in this step of the planning process. Describing existing conditions is a daunting task. There is so much information that could be gathered and there are so many stakeholders with their own interests and agendas, that it is virtually assured that you will not have all the information necessary to satisfy all these people. *Limitations on the quantity and quality of information will result in uncertainty*. Admit that from the outset. Explain what you collected and why you collected it, tell your story. If important dimensions of the planning effort are subject to serious uncertainty, be open and above board about it.

Uncertainty is a fact of life.

Describing future conditions is even more uncertain. In this step, you are asked to forecast conditions for the variables, elements, and systems identified in your information-gathering strategy. *No one expects you to foresee the future with perfect clarity, but everyone will expect you to see what, after the fact, everyone claims was obvious*. Partners must be honest with one another and with the stakeholders. Uncertainty is a fact of life and both Corps customers and partners can handle that as long as the uncertainty is described honestly, openly, and in a straightforward manner.

HOW TO FORECAST

Suppose you have done an extraordinary job in identifying and gathering the information you need to describe the existing conditions in the study area. Further suppose you have identified the variables, conditions, elements, and systems that need to be forecast in order to describe alternative future conditions. There is still the considerable task of making those forecasts. How do you do that?

To develop plans for a community or region, we need to predict the type of environment they'll be facing in the short- and long-term future. *The purpose of forecasting is to identify patterns in natural systems and human behavior and to discover relationships among variables and systems so we can estimate the timing, nature, and magnitude of changes in future conditions*.

Though many taxonomies of forecasting methods could be used, we'll rely on three major categories as shown in Table 25, taken from Wheelwright's book *Forecasting Methods for Management*. **Judgmental methods** are the most common forecasting technique used in planning. These forecasts include individual judgments, committee or team decisions, and other forms of professional opinion. Professional judgment is often relied upon to forecast the effectiveness of ecosystem restoration alternatives, project performance, and many other important aspects of both without and with conditions.

Quantitative methods are the subject of most of the forecasting literature; three subcategories are identified. **Time series methods** forecast future events based on trends in historical data. **Explanatory methods** attempt to identify cause and effect relationships among variables in the past. These relationships are then used to forecast future outcomes. These two sets of methods are frequently used by economists. **Monitoring methods** are relatively new. They seek to identify changes in patterns and relationships to make forecasts when extrapolation of past patterns or relationships is not appropriate. Such methods may be particularly useful in environmental planning, where systems are poorly understood because of their complexity or lack of data.

Table 25: Forecasting Methods

Approaches to Forecasting	Selected Groups of Forecasting Methods	Major Forecasting Methods
Judgmental	Individual Judgment	Intuitive
		Ad hoc
		Multiple attribute decision-making
	Group	Committees
		Sales force estimates
		Juries of expert opinion
	Aggregates	Anticipatory surveys
		Market research
Quantitative	Time Series	Naive
		Decomposition
		Simple time series
		Advanced time series
	Explanatory	Simple regression
		Multiple regression
		Econometric methods
		Multivariate methods
	Monitoring	Tracking signals
Technological	Extrapolation	Delphi
		Trend extrapolations
		Morphological research
		Systems dynamics
	Normative	Cross impact
		PATTERN
		La Prospective

The third forecasting category includes **technological methods**. These methods address long term issues of a technological, societal, economic, or political nature. There are two subcategories. **Extrapolation methods** use historical patterns and relationships as a basis for forecasts. **Normative methods** rely on objectives, goals, and desired outcomes as a basis for forecasting.

Details of these and other forecasting methods can be found in the considerable forecasting literature. Texts and articles are available on each of the major forecasting methods shown in Table 25. There are considerably more techniques in use, however. A 1975 IWR report, *Handbook of Forecasting Techniques*, and its appendix, *Part II Description of 31 Techniques*, remain good source documents.

When data exist, time series and explanatory methods will generally be the most useful techniques. These are covered best in the literature. Courses in these techniques are available at many universities. When faced with unique situations or situations in which data are unavailable, judgment and technological methods will dominate. Opinion analysis will be another valuable tool for planners. There are any number of specific techniques that comprise the major forecasting methods shown in the table. For example, subjective probability elicitations and nominal group methods are two examples of juries of expert opinion. Consult the literature, like the IWR Handbook, for details on specific forecasting methods.

THE WITHOUT-PROJECT CONDITION

The "without-project condition" is universally regarded as vitally important to the evaluation, and comparison of alternative plans. No single element of the planning process is more critical to those steps of the planning process than this forecast of the most likely future conditions that will exist in the study area if no action is taken as a result of your study. The inventory and forecast of conditions in the study area are the step two tasks necessary to develop the without-project condition.

In forecasting, we look into our crystal ball and try to describe the most important aspects of life in the study area over the next several decades. This forecast is based on our existing condition, in which we adequately describe the most important current aspects of life related to our planning effort. Our forecasting efforts build upon that base condition. Using a variety of forecasting techniques, we paint one or more pictures of what the future might look like. From the alternative future conditions, we select one as the most likely future condition.

…we look into our crystal ball and try to describe the most important aspects of life…

This most likely future condition is not necessarily the only possible future condition but it does become our baseline picture of the future. *When we consider how our alternative plans will alter the future, we are always comparing alternate future conditions, with different plans in place, to our without project condition.*

The other possible futures without a plan in place may be considered again in a sensitivity analysis. If we have selected a plan that looks "best" under all forecasted futures, then we can be confident we have the best plan. If the "best" plan varies with the forecasted future without a plan in place, then decision-makers must be apprised of the differences and their implications.

Every plan is compared to the same without- project condition.

Planners identify and quantify the explicit differences among plans (to anticipate a future chapter, this is called evaluation) and make some judgments about their relative merits (comparison) before a decision is made (selection). Every plan is compared to the same without-project condition.

Think of the future in the study area without any plans as consisting of a mix of good and bad outcomes. We have a pile of good things that will happen (dogwoods in spring, jobs, fishing, and so on) and a pile of bad things (pollution, flood damages, recessions, and the like). Conceptually, we estimate the most important of these things related to our study over the planning horizon and pile them up.

We do the same for each of the plans we formulate. The piles without a plan and with a plan can differ in many ways. The size of the piles may be different. There may be more or fewer good things with the plan. There may be more or fewer bad things. In addition to different sizes, the piles are likely to have different compositions. The beautiful dogwoods in spring may be gone now; they may have been sacrificed to levees that reduce flood damages. Thus, the future good pile has fewer dogwoods, but the future bad pile has less flood damage.

The No Action Alternative

The without-project condition describes the future that society will have to forego if action is taken. Conversely, that means the without project condition is what will result if no action is taken. When formulating plans, NEPA regulations require that the no action alternative always be considered. In essence, this requires any action that is taken to be more in the public interest than doing nothing. The without-project condition is, then, the default recommendation. It is the no-action alternative.

The image of the piles helps us understand the basic trade-offs society faces. If a plan diminishes or changes the pile of good things the without condition produces, then these are things that society loses as a result of the plan. They are costs to society. If the without condition pile of bad things gets smaller, that's a benefit to society. The with condition will, of course, add good things (additional benefits to society) at the cost of some bad things (additional costs to society). Thus, beneficial plan impacts come from the elimination of "bad" things in the without condition scenario or the addition of "good" things in the with-project condition. Negative plan impacts come from the elimination of good things under the without condition scenario and the increase in bad things from the with-plan condition.

The decision-makers' difficult task is to decide which set of piles are better to have, the without condition or the with condition piles. That decision can't be made based solely on size, because we have not addressed the all important question of the value that society places on the things in each pile. The important point to understand at step two in the planning process is that all plans are compared to the same piles of good and bad things without a plan implemented. *The decision cannot be a good one unless the without condition description is fair and accurate*. The piles have to include all the important things, and those must be measured reasonably.

It has been suggested by experienced planners and plan reviewers alike that one of the most common problems with Corps planning efforts is that the without condition description is not adequate. In the worst instances, the description of the most likely future condition can be slanted to favor a specific alternative plan. It would not take much to manipulate the descriptions of the things that go into our good and bad piles in a manner that could distort results. Sometimes the descriptions are naive or incomplete. *A good without condition description is essential to a good decision.*

CHARACTERISTICS OF A GOOD WITHOUT PROJECT CONDITION

Table 26 summarizes some characteristics of a good without-project condition. First, it is **comprehensive**. *The without condition must adequately describe the future.* Significant variables, elements, trends, systems, and processes must be sufficiently described to support good decision-making. If it's important to the decision process, it has to be addressed in the without-project condition description. Planners cannot overlook important information.

Table 26: Characteristics of a Good Without Condition

Comprehensive
Rational
Alternative Future Oriented
Honest
Inclusive

Next, the without condition must be **rational**. Forecasts must be based on appropriate methods, and professional standards must be applied to the use of those methods. **Accuracy** *is an important element of a rational scenario.*

Good without conditions are not irrational. All future scenarios should be based on the assumption of rational behavior by future decision-makers. *Future scenarios must make sense.* Scenarios that rely on an unlikely series of events or irrational behavior make no sense. If a problem can be solved by a $500,000 expenditure each year or a one-time $1,000,000 expenditure, it would be irrational to assume an indefinite expenditure of $500,000 under most circumstances. A good scenario must pass the test of making common sense.

Without project conditions are not before and after comparisons. Before and after comparisons can miss the causality that is important to effective plan evaluation. Suppose a county has 2,000 jobs. Part of the without-project condition includes legalization of gambling and construction of a casino that will increase county

Policy May Affect Without Condition

Without-project conditions should be rational. Rationality can come from different directions, however. Section 4-11 of ER 1105-2-100 provides a list of eight constraints to, and clarifications of, the without-project condition.

Suppose for example, Congress has established a clear Federal interest in undertaking certain activities through legislation, as it has done with flood control. Further suppose that if the partnership does not build a project, the non-Federal partner will. What is the without-project condition? The truth is the without project condition includes the project! In this case, however, paragraph 4-11.a.(8) says:

> If local interest (sic) are willing to build a given flood control project, but only if the Corps doesn't do it, assume no project as without-project condition.

jobs to 11,000, a net increase of 9,000 jobs. Suppose a wetlands restoration project limits the development potential of some land such that the county, with its new casino, will have only 10,000 jobs.

A before and after plan analysis shows jobs rising from 2,000 to 10,000, a net increase of 8,000 jobs. Such a comparison gives the impression of causality when none exists. The appropriate comparison is a without and with project comparison in which we see a net decrease of 1,000 jobs. The implementation of the wetlands restoration plan actually costs the county 1,000 jobs.

Without-project conditions have to be **future oriented**. Conditions that concentrate on causality of existing conditions and focus too narrowly on how existing conditions might change fail to be future oriented. Without-project conditions are not mere extensions of existing conditions. They need to be oriented toward comparing alternative future scenarios.

The fourth characteristic of a good without condition is **honesty**. *This obviously means there should never be deliberately misleading information in a scenario, nor should any important information ever be deliberately withheld*. This quality goes beyond basic honesty, however, to include the forthrightness about the strengths and weaknesses of the analysis that is needed to enable an interested stakeholder or a decision-maker to make their own qualitative assessment of the work you have done.

An honest scenario would point out weaknesses and soft spots in the analysis, taking care to try to identify the implications of these "faults." Honesty also implies a sincere effort to convey the full implications of the scenario. Honesty requires that if significant differences in the future scenario exist, they are also honestly and completely described as alternate without-project conditions.

A good without-project condition is also **inclusive** in the sense that it is subjected to rigorous review and comment as part of the public participation process and throughout the coordination and review process. *Because the without- project condition occupies such a critical role in the planning process, it is essential that it be developed in the open and subjected to the scrutiny of all project stakeholders before the project proceeds too far.* In some cases, this will simply mean that

technical data and information receive an unbiased thorough technical review. In other cases, where judgmental or technological changes are being considered, the review and coordination may have a structured part in the public participation process.

SUMMARY AND LOOK FORWARD

Lesson One. Planning studies are iterative processes. The problems and opportunities of the planning area cannot be understood until we have information about existing and future conditions. The distinctions between the first and second steps are not as clear as we would like them to seem.

Lesson Two. Planners need information not data; but data contain the necessary information. In a world of limited budgets, the key is to collect the data needed, not the data available. An information-gathering strategy can help you identify what is needed and where to get it.

Lesson Three. Acknowledge the uncertainty you face. No one expects you to have all the information or to forecast perfectly. Let stakeholders and decision-makers know the limits of your knowledge and certainty.

Lesson Four. The future is usually different from the present.

Lesson Five. With-and-without planning is not the same as before-and-after planning. Describe the without-project condition as comprehensively, rationally, honestly, future-oriented and inclusively as you can. Use more than one scenario if necessary.

Now that we know the problems and opportunities and have described future conditions without a plan, we need some plans that can alter that future in a favorable way. Formulating alternative plans is the subject of the next chapter.

SUGGESTIONS FOR FURTHER READING

The NED Benefit and Cost Manuals and ER 1105-2-100 provide additional details on the without-project condition. Many of the items listed at Appendix I provide detailed suggestions of useful data for various types of planning studies. The *Handbook of Forecasting Techniques* IWR Contract Report 75-7 and its supplement, *Handbook of Forecasting Techniques Part II Description of 31 Techniques*, though somewhat dated, still provide a good basic introduction to many of the forecasting techniques mentioned in this chapter.