ESTIMATION OF ECONOMIC IMPACTS OF THE AGRICULTURAL AND RECREATIONAL ACTIVITIES IN SPRING VALLEY AREA< WHITE PINE COUNTY: AN APPLICATION OF INPUT-OUTPUT ANALYSIS

Introduction

This memorandum will discuss the estimation of economic activity in the Spring Valley Area of White Pine County, Nevada. This memorandum will use data from an exhibit authored by Karen Rajala (2006). The purpose of this memorandum is to provide a general overall analysis of impacts of potential reduction in economic activity in the Spring Valley Area in White Pine County, Nevada. Specifically this memorandum will be split into three parts:

(1) Part I will discuss the concepts of multipliers in an economy,

(2) Part II will employ input-output procedures to estimate the impacts of economic activities in the Spring Valley Area on the White Pine County, Nevada economy, and

(3) Part III will discuss limitations of input-output analysis, the verification and validation of the IMPLAN model and data, and suggested further study of water transfers from Spring Valley Area of White Pine County, Nevada to Clark County, Nevada. This would entail the development and use of a dynamic interregional Computable General Equilibrium Model.

Some Basic Concepts of County Economics and Income and Employment Multipliers

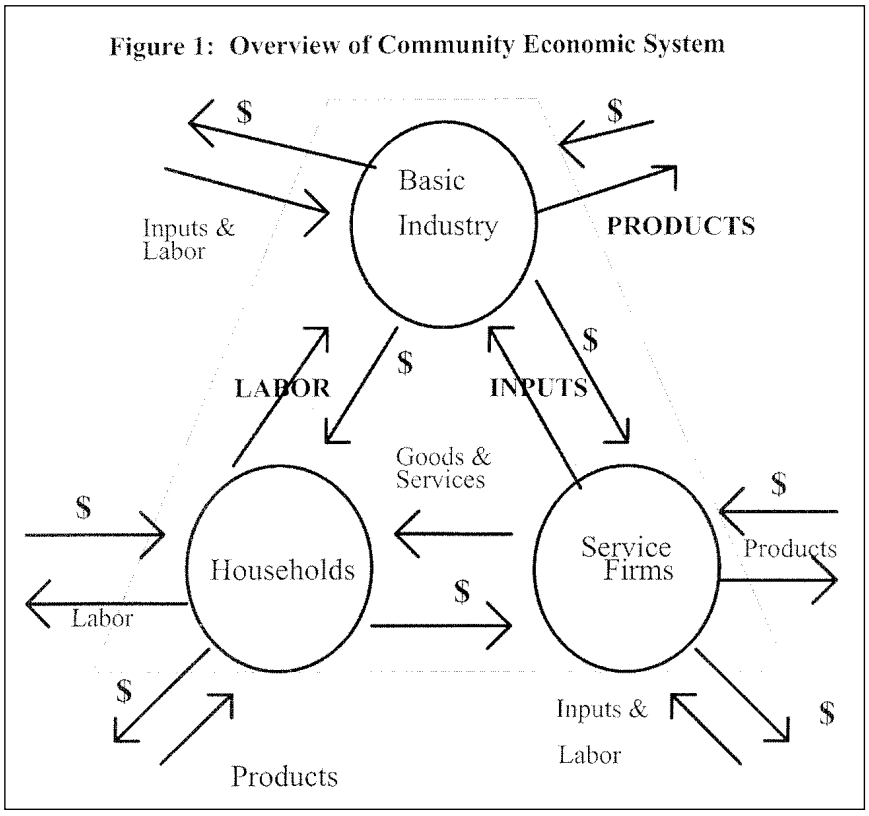
Figure 1 illustrates the major dollar flows of goods and services in any economy. The foundation of a county's economy is those businesses which sell some or all of their goods and services to buyers outside of the county. Such a business is a basic industry. The flow of products out of, and dollars into, a county is represented by the two arrows in the upper right portion of Figure 1. To produce these goods and services for "export" outside the county, the basic industry purchases inputs from outside of the county (upper left portion of Figure 1), labor from the residents or "households" of the county (left side of Figure 1), and inputs from service industries located within the county (right side of Figure 1), and inputs from service industries located within the county (right side of Figure 1). The flow of labor, goods and services in the county is completed by households using their earnings to purchased goods and services from the county's service industries (bottom of Figure 1). It is evident from the interrelationships

illustrated in Figure 1 that a change in any one segment of a county's economy will have reverberations throughout the entire county economy.

Consider, for instance, alfalfa hay production in the Spring Valley Area of White Pine County, Nevada, and its impacts on the White Pine County economy. The production activities of the alfalfa hay growers in the Spring Valley Area can be considered a basic industry as it draws dollars from outside White Pine County. These dollars may hire people from the local household sector such as laborers to work in the alfalfa hay fields. However, additional local economic linkages are from purchases of goods and services by alfalfa hay producers in the Spring Valley Area from White Pine County local service sectors. These include businesses such as restaurants, gas stations, hotels and other retail businesses. As earnings increase in these businesses, they will hire additional people and buy more inputs from other businesses. Thus the change in the economic base works its way throughout the entire local economy.

The total impact of a change in the economy consists of direct, indirect and induced impacts. Direct impacts are the changes in levels of production by the Spring Valley Area alfalfa hay producers. The Spring Valley Area alfalfa hay producers change their purchases of inputs as a result of the direct impact. This produces an indirect impact in the local business sectors. Both the direct and indirect impacts change the flow of dollars to the county's households. The local households alter their consumption accordingly. The effect of this change in local household consumption upon businesses in a county is referred to as an induced impact.

A measure is needed that yield the effects created by an increase or decrease in economic activity. In economics, this measure is called the multiplier effect.



Inter-Industry Analyses

Within a county economy, there are numerous economic sectors performing different tasks. All sectors are dependent upon each other to some degree. A change in economic activity by one sector will impact either directly or indirectly the activity and viability of other sectors in the economy. In order to show these interdependencies and interventions between economic sectors, a county-wide input-output model can be used.

Agricultural Impacts

Input-output models derive the linkages and multipliers for economic sectors in an economy. For this analysis, the microcomputer input-output model, IMPLAN (Minnesota IMPLAN Group, Inc., 2000), was used to derive economic linkages for White Pine County. The agricultural sectors impacted for this analysis are the alfalfa hay, cattle, and sheep growers. After discussions with IMPLAN (2006) personnel for IMPLAN, the alfalfa hay growers will be

in the Other All Crops Sector, the livestock activities are under the Cattle and Farming Sector, and activities by sheep growers are under the Animal Production, Except Cattle and Poultry and Eggs Sector.

Using information from Rajala (2006) and the IMPLAN software (2000), the Other All Crops Sector (alfalfa hay) value of production in the Spring Valley Area alfalfa was estimated to be $2.630 million with labor and household income of 10 employees and $0.378 million, respectively. For the Cattle and Farming Sector (cattle) in the Spring Valley Area, value of production was estimated to be $1.380 million with employment and household income estimated to be 8 employees and $0.066 million, respectively. For the Animal Production, Except Cattle and Poultry and Eggs Sector in the Spring Valley area, value of production were estimated to be $0.234 million with employment and household income estimated to be 3 employees and $0.021 million, respectively. The summation of alfalfa hay, cattle, and sheep production in the Spring Valley Area is designated as agricultural activities in Spring Valley area.

From Table 1, agricultural activities for the Spring Valley Area had a production level of $4.240 million, hired 21 employees, and paid labor income of $0.465 million. Given the multiplier impacts, agricultural operations had total economic impacts of $5.394 million. This means that beyond the direct economic impacts of $4.244 million, the indirect and induced impacts agricultural operations on the White Pine County economy was $1.150 million. Indirect impacts are the additional expenditures between economic sectors after the initial direct expenditure is made. Induced impacts are the additional expenditures and economic activity attributable to household sector interactions.

Also from table 1, agricultural operations had total employment and labor income impacts of 31 jobs and $0.681 million, respectively. This means that due to the economic linkages of agricultural operations an additional 10 jobs and $0.216 million in labor income was created in White Pine County from indirect and induced linkages.

Table 1. Economic, Employment, and Labor Income Impacts of Agricultural Operations in the Spring Creek Area of White Pine County, 2003

Categorical of Impacts	Direct Effects	Indirect and Induced Effects	Total Effects
Economic*	$4.244	$1.150	$5.394
Employment	21	10	31
Labor Income*	$0.465	$0.216	$0.681

Reported in Millions of Dollars*

Recreational Impacts

Not only is the Spring Valley Area economy impacted by agricultural operations, recreational activities impact this area and White Pine Economy. Recreation in the Spring Valley Area includes visits to the Great Basin National Park, dispersed recreation on federal land, and hunting and fishing. Given that there are no recreational studies in the Spring Valley Area, proxies were used to estimate impacts from recreation. Using the National Park Service recreational impacts model or the MGM2 model, the estimated expenditures per visitor day were estimated to be $70.00. Since no direct recreational expenditure data was available, the results of an analysis by Rajala (2006) can be used to estimate recreational impacts.

From Rajala (2006), direct economic impacts of recreational activities in the national park associated with the Spring Valley Area would be $937, 500 with total economic impacts of $1.030 million. Also the direct economic impacts of recreation on other federal lands were estimated to be $2.8 million. Rajala (2006) also estimated the potential economic impacts of big game hunting from Nevada Department of Wildlife reports to be $418,390 in White Pine County. Economic impacts from hunting and fishing by Rajala (2006) in the Spring Creek Valley Area were estimated to be $482,387 annual. As can be seen given a lack of recreational survey data, recreation estimates are by proxy. Therefore a need for primary recreational expenditure data is needed for a more accurate analysis.

LIMITATIONS AND FUTURE REQUIRED ANALYSIS

A formal analysis of the economic impacts of the Spring Valley Area requires more in-depth analysis and dynamic model development. Below are points of limitations and suggestions for future analysis:

- Recreation on lands in the Spring Valley Area is important to this analysis. A study that employs data from primary recreational expenditure survey is needed. These questionnaires can validate the expenditures estimated by the MGM2 model and also derive the location of expenditures. Location of expenditures is important because if they are made outside of White Pine County, these expenditures should not be part of the multiplier analysis. Also estimation of different expenditure pattern for recreational

activities such as hunting, fishing, big game hunting, etc. can more accurately estimate the impacts of recreational declines in the Spring Valley Area.

- Further use of the IMPLAN microcomputer input-output software to estimate the economic impacts in White Pine County from Spring Valley activities requires that the data and matrices of IMPLAN be tested for accuracy, consistency, and validity. In a publication by Holland, et al. (1997), several steps are provided which can be used to validate the White Pine County input-output model. Also Lahr (1993) provides steps for primary data collection to validate and verify county input-output models. Using income and employment data from the U.S. Department of Commerce (2006), the State of Nevada Department of Employment, Training, and Rehabilitation (2006), and primary interview data of selected economic sectors; an input-output model for White Pine County can be verified and validated.

- In the analysis of agricultural impacts, alfalfa hay impacts were estimated using the All Other Crops Farming Sector. Also livestock impacts were derived fro the Cattle and Farming Sector and sheep impacts were estimated from the Animal Products, Except Cattle and Poultry and Eggs Sector. Using cooperative extension budgets, agricultural sectors could be developed for the input-output model. Procedures developed by Coupal and Holland (1995) could be followed to transfer agricultural budget data into the input-output model. Therefore a separate Alfalfa Hay Sector, Range Cattle Sector, and Sheep Sector could be developed which could more accurately estimate the economic impacts of these agricultural sectors. Using current IMPLAN data and model, these impacts are estimated by aggregated agricultural sectors.

- Estimates for this paper were estimated from a static input-output model. To more accurately estimate the economic impacts a dynamic computable general equilibrium model is required. To estimate a dynamic computable general equilibrium model, procedures outlined by Sueng et al. (2000) could be followed. A dynamic computable general equilibrium model can derive impacts of reduced activities in the Spring Creek Area through time in White Pine County. Also welfare impacts to White Pine County can be estimated through procedures outlined by Sueng et al. (2000).

References

Coupal, R. and D. Holland. "On the Use of Farm Enterprise Budgets in Interindustry Analysis: and Example from the Washington State Wheat Study". Pacific Northwest Regional Economic Conference, Proceedings.1995.

Holland, D.W., H.T. Geier, and E.G. Schuster. "Using IMPLAN to Identify Rural Development Opportunities." United States Department of Agriculture, Forest Service, Intermountain Research Station, General Technical Report, INT-GTR-350, May 1997.

Lahr, M. "A Survey of Literature Supporting the Hybrid Approach to Constructing Regional Input-Output Models." *Economic Systems Research*, 5(1993): 277-293.

Minnesota IMPLAN Group Inc. **IMPLAN Pro: User's Guide**, Minnesota IMPLAN Group, Inc.: Stillwater, Minnesota, 2004

Minnesota IMPLAN Group, Inc. Personal Conversation, 2006.

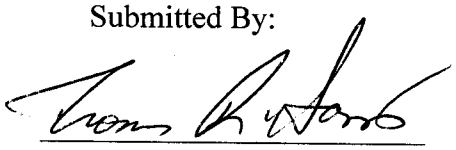
Rajala, K. "Summary of Information Regarding the Economic Value Generated by Agriculture and Recreational Activity in Spring Valley, White Pine", White Pine County Economic Diversification Council, Ely, Nevada, June 26, 2006

Seung, C.K., T.R. Harris, J.E. Englin and N.R. Netusil. "Impacts of Water Reallocation: A Combined Computable General Equilibrium and Recreation Demand Model Approaches." Annals of Regional Science, 34: 473-487, 2000.

State of Nevada Department of Employment, Training, and Rehabilitation. Nevada 2005 Employment and Payrolls. Bureau of Research and Analysis, Carson City, Nevada, 2006.

U.S. Department of Commerce. "Regional Economic Information System." Bureau of Economic Analysis, Washington, DC, 2006.

Submitted By:



Thomas R. Harris

July 30, 2006

Date