
Graduate School of Development Studies

# Water Rights and Markets in Chile:
## Efficiency and Social Equity in Agricultural Irrigation

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## *Contents*

## List of Tables



## List of Figures

**List of Acronyms**

| | |
|---|---|
| ADC | Associacion de Canalistas |
| BIH | Basic Irrigated Hectare |
| CNR | Comisión Nacional de Riego |
| CDA | Communidad de Agua |
| CORA | Corporacion de la Reforma Agraria |
| DGA | Dirección General de Aguas |
| FME | Free Market Environmentalism |
| GVC | Global Value Chain |
| INDAP | Instituto Nacional de Desarrollo Agropecuario |
| JVA | Juntas de Vigilancia |
| MOP | Ministerio de Obras Públicas |
| NIE | New Institutional Economics |
| NTAE | Non-traditional Agricultural Exports |
| PR | Property Rights |
| SSC | Supermarket Supply Chain |
| SSF | Small-scale Farmers |
| SLAR | State-Led Agrarian Reform |
| TNC | Transnational Corporation |
| WUA | Water User Association |

**Abbreviations**

| | |
|---|---|
| Hectares | ha |

**Abstract**
This paper addresses the neoliberal assumptions for private property rights to incentivise water and water markets. Chile´s 1981 Water Code is used to display the juxtaposition of efficiency and social equity of water markets in providing water access for different groups within a liberalised agricultural sector. The fruit industry is a specific example for the incentive to allocate water to high-value production for national and transnational fruit companies. New Institutional Economics provides a realistic perspective to the socio-economic power dynamics in the competition for scarce water resources within water markets.

**Keywords**
Water markets, private property rights, efficiency, social equity, agriculture

# Chapter 2 Introduction and Methodology

## 2.1 Introduction

The global community faces potential water crisis associated with resource extractions for a billowing population and its drive for economic development. Supply augmentations for these purposes are determined by economic policies, management frameworks, and technology (Saleth and Dinar, 2004). The 1992 Dublin Conference on Water and Environment produced a statement that set forth four principles guiding water management and distribution, the fourth of which states, "water has an economic value in all its competing uses, and should be recognised as an economic good" (Solanes and Gonzalez-Villarreal, 1999: 8). This principle reveals mainstream visions to mitigate state mismanagement and demand-driven water stress by acknowledging water as an economic good in order to create water rights and markets that economically value and price water to incentivise efficient use (Donoso and Melo, 2004). This market model is considered the future for effective water management of consumptive and non-consumptive water (Budds, 2009b).

The Chilean water reform that started with the Water Code of 1981 is a text-book model of a market-based approach to water reform and regulation policy, and is widely praised as a success by the World Bank, Inter-American Development Bank, and others (Bauer, 2005: 147; Galaz, 2004; van Koppen, Giordano, and Butterworth, 2007). Its approach to natural resource management is a clear example of Free Market Environmentalism (FME) in water management. FME's core principles use strong private property rights (PR), tradability of rights, and gains from trade to stimulate cooperation for solving environmental problems like water scarcity (Anderson and Leal, 2001). In identical fashion, to reach allocative efficiency, the 1981 water reform established legally enforceable and tradable water property rights. Thus, as an economic good that internalises its scarcity value, the water rights could be bought and sold on water markets. The market mechanism is assumed to optimise allocation to highest-value uses, boosting water-use efficiency and productivity (Budds, 2004; Dosono, 2006; Ellis, 1992; Hearne and Dosono, 2005; Perman, Ma, McGilvray, and Common, 2003; Solanes and Jouravlev, 2006).

This starkly neoliberal reform represented a political shift away from public investment and control of the water sector toward a market model as part of the liberalising, deregulating, and privatising trend in Chile at the time—and the world for that matter—following Washington Consensus recommended policy instruments (Haughton, 2002; Romano and Leporati, 2002; Williamson, 1990).

Especially common to the neoliberal program were private property rights, markets, and decentralised decision-making (Boelens and Zwarteveen, 2005: 735) Significant and the cause of controversy is how this distribution mechanism places costs and benefits on different members of society (Donoso and Melo, 2005). In Chilean water markets, the way the Code's neoliberal assumptions have been realised arguably reveals a discursive commitment to overall sector improvement while the base in efficiency limits small farmer engagement. The institutionalised inequalities and power asymmetries within the agricultural sector influence the distribution of PR endowments to favour large, high-value producers. The control and power wielded by large farmers and agribusinesses re-centralises authority in their hands, a simple shift of authority from the state to powerful non-state actors (Boelens, 2004; Wilder and Lankao, 2006).

Global water resource total withdrawals are expected to rise 27% in developing countries by 2025 (Donoso and Melo, 2004: 14) requiring that water reform be both economically efficient and socially equitable. As the honorary fourth factor of production,[1] water, like land, is limited in availability, necessary for production, and exhibits the law of diminishing returns (Perman, Ma, McGilvray, and Common, 2003: 5). The water institutional framework—national water policy, water laws, and water organisations (Saleth and Dinar, 2005)—is embedded in the myriad interlinkages between society and nature, and the dynamism of natural resource management and economic development plans (Saleth and Dinar, 2004).

This paper uses New Institutional Economics (NIE) to understand the contextual dynamics of the Chilean market where actors of varying bargaining power use institutions to reign in transaction costs and information to reach efficient allocation. Given this, the paper argues that actor engagement in water markets is determined by the bargaining strength to reduce or absorb transaction costs, access and act within institutions and acquire or improve infrastructure for technical efficiency. Where bargaining power is absent, such as for small farmers and peasants, it arguably results in fewer rights, fewer registrations of new or historic rights, and less buying and selling on the market. The way NIE theorises ideal market activity is apparent in some of the neoliberal assumptions behind the Water Code. The real outcomes that violate the neoliberal assumptions are seen most in the small farmer sector. This suggests that with objective of efficiency, the Code promoted water use by those who can afford to purchase it for high-value production.

[1] Land, labour, capital.

There is ample literature covering a range of topics and studies linked to the private property rights and water markets system in Chile. These include the following: economic and financial gains from trade (Hearne and Easter, 1997); indigenous community rights and legal pluralism (Boelens, 2003 and 2009; Budds, 2009b); the political economy of water markets (Bauer, 1997 and 2005; Solanes and Jouravlev, 2006), neoliberal ideology and neoliberal reform (Budds, 2004), and water institutions and institutional reform (Donoso, 2006; Donoso and Melo, 2006), water market coordination and failure (Zegarra, 2002), and water distribution impacts (Romano and Leporati, 2002).

Amidst this rich literature a research gap exists concerning how the neoliberal assumptions for the Code have actualised, and how this has specifically challenged the viability of small farmers. This paper intends to fill that gap.

## 2.2 Research Objectives

The first objective of this research is to analyse how the underlying neoliberal policy assumptions for an efficiency-based market allocation system have proven true, where they have been false, and how this affects small farmers in specific. The second objective is to understand the mechanisms that benefit or disadvantage water users given certain pre-existing conditions of agricultural and economic growth.

The research question is this: In the context of post-Agrarian Reform Chile, how have the neoliberal assumptions for the 1981 Water Code played out differently for different agricultural groups?

The research sub-questions are as follows:

- What are the economic and ideological assumptions behind the 1981 Water Code?
- How is water market engagement shaped? What mechanisms are used in this?
- What are the benefits or drawbacks to the policy and how its assumptions have played out for certain actors?
- What social and economic changes among actors may be actively produced by this market-allocation system?

## 2.3 Limitations to the Research

Data on water rights in Chile is private, inaccessible without payment, and otherwise requires geographically focused field research. The General Water

Directorate (DGA), established a national registry several years ago, but it does not compile past data. In order to access data, one must pay roughly 1 USD per record. Field research is necessary to attain the needed information, but only with a time span greater than was available for this research and in a very limited research area (J. Budds, personal communication, 26 September 2009). Hence, this paper is limited to literature review, taking both a general view of water markets conceptually, and their role specifically in Chile through key examples in various regions.

## 2.4 Methodology

The paper relies on a review of relevant literature and studies providing information on water markets, Chilean water markets, agricultural performance, and social aspects of agriculture sectors. This literature is used to understand the neoliberal assumptions for water markets, the efficiency and equity of the market mechanism in allocating water, and the possible disparities in these assumptions that disproportionately affect small farmers. A general understanding of the water institutional framework is constructed from this array of literature.

The statistics used in this paper originate from several distinct sources. First, the 1980s data in Gomez and Echenique (1988) was compiled in part from data they sourced from the Natural Resource Information Centre (CIREN) and Corporation for Production Promotion (CORFO) who relied on tax information from 1983. Second, data on landholdings are from the agricultural and forestry censuses, *Censo Nacional Agropecuario y Forestal*, from the National Institute of Statistics (INE) for years 1997 and 2007. Third, supplementary statistics were sourced from databases of the Food and Agriculture Organization of the United Nations (FAO), as well as the Earthtrends database by the World Resources Institute's (WRI). On caveat about the census data must be mentioned. The 1997 and 2007 censuses count 26 and 29 million hectares of agricultural land, respectively, but this differs greatly from the FAO calculations that agricultural land was 1.52 million (1997) and 1.57 million (2007). The explanation accepted for this discrepancy is the different definitions of agricultural land. The census definition of agricultural land is wide, extending to agricultural cultivation, plantation forestry, native forests and thicket, idle land, sterile and un-usable lands (OECD, 2009).

The presentation and use of the 1997 and 2007 census data from the INE is to use agricultural land ownership and use trends to determine what groups hold land, what they are producing, and how this may implicate water use. It is according to:

Original data on water rights comes from studies and field research conducted by water professionals, economists, and PhD researchers. These studies have proven critical in light of the previously stated limitations to accessing new, primary data. Specifically, data is from the following studies in the Limarí Valley (Coquimbo, Region IV):

- Eduardo Zegarra (2002) on market coordination and market failure in the context of a recently ended three year drought, based on a 1998 field survey.
- Romano and Leporati (2002) on distributive impact, based also on a 1998 field survey with results spanning 1981-1997

These two studies comprise part of a limited body of field research with water rights information. This data is used to complement the literature in showing how the neoliberal assumptions for water markets are actualised differently among different groups.

# Chapter 3 Theoretical and Conceptual Background

The following section discusses the concepts essential to understanding some of water markets and their implementation. The next section provides an introduction to the key points of property rights regimes which are foundation to water markets. This is followed by the economic justification for water markets as the mechanism for market-based water allocation. This leads to the next section which discusses the neoliberal assumptions providing the backbone of the justification for the water reform in Chile, led by the 1981 Water Code. Finally, the theory of New Institutional Economics (NIE) is introduced. This theory is beneficial for understanding the socio-economic dynamics of participant competition for scarce water resources in water markets, and the challenges the standard of efficiency poses to small farmers.

## 3.1 Concepts in Water Market Literature

### *Institutions*

Institutions are the formal or informal rules of the game that give structure to everyday life (North, 1990). Saleth and Dinar (2005: 2) define the institutional framework as a composition of water laws, water policy, and water organisations that are "subjective, path dependent, hierarchical and nested both structurally and spatially and embedded within the cultural, social, economic, and political context." This paper includes in this term aspects of power and bargaining strength.

### *Private Property Rights and Water Rights Bundles*

Water rights are defined as the rights and restrictions over the use of particular water sources (Budds, 2004: 323), indicating an exclusive right to extract from a source, or use without full extraction (Donoso, 2006: 159). Beyond legal dimensions, property rights also refer to social relationships between *people* in regards to an object (e.g. water) essentially reflecting a "social relationship and an expression of power among humans" (Boelens, 2003: 3).

Beyond solely a legal view, property rights represent 'bundles' of contingent rights that include rights to access and withdraw water; to manage and make decisions; to exclusive use and transfer; and the right to use water rights to earn income (Roth, Boelens, and Zwarteveen, 2005: 240-241; Schlager and Ostrom,

1992 in Bruns, Ringler, and Meinzen-Dick., 2005: 29).

### *Efficiency and Equity*

Among many objectives for national, provincial, or local agricultural policies, the social objectives are simplified to optimal resource use that benefits society as a whole through economic growth. Where there are constraints in resource supply and allocation, or technology, the policies are meant to alleviate or circumvent the constraints (Ellis, 1992).

In neoclassical economics, efficiency is the optimal use of a resource, by moving it from less to more efficient use or by increasing the resource's productivity (Ellis, 1992: 19) for the aggregate benefit of society (Dinar, Rosegrant, and Meinzen-Dick, 1997). It is based on the principle of Pareto improvement. A Pareto improvement is a gain for one or several persons that do not harm anyone else. When all the possible Pareto improvements are exhausted it is considered allocative efficient. Strictly speaking, this focuses on allocation only, not on physical or technical efficiencies. Well-defined property rights are considered one of the necessary conditions for efficient allocation (Perman, Ma, McGilvray, and Common, 2003). Where allocation is economically efficient, the marginal benefit in one sector will be equal to the benefit in another. If not, then the market will reallocate it to the sector with the highest returns (Dinar et al., 1997: 4).

Similarly, as core of welfare economics, the Pareto optimum principle indicates a situation when no one may be made better off without making someone else worse off. Fulfilling Pareto improvements or allocative efficiency may follow different paths, according to competitive processes and initial income distribution of market participants (Ellis, 1992: 24-25; Perman et al., 2003).

In contrast to efficiency, equity considers the distribution of economic benefits and equal access to water resources for all members of society irrespective of economic standing. Standards of equity are not fixed. They are considered acceptable based on local ethics and fairness, as well as the gender, ethnic, or class background of actors involved (Cai, 2008: 16; Cremers, Ooijevaar, and Boelens, 2005: 40; Saleth and Dinar, 2004). Efficiency can contribute to equity by making more water available for other users by reducing the unnecessary waste of others. Efficiency and equity are not mutually exclusive, but while equity may use efficient means to bring about its end, the principal of efficient allocation precludes equity as a necessary factor or outcome.

### *Scarcity*

From a natural resource perspective, Cleveland and Stern (2001: 238) assert that resource scarcity is a decline in economic welfare due to diminishing "quality,

availability or productivity" of a resource. A moderate view, argued by Mehta, suggests that water availability and renewability is subjective to the reciprocity of the following spheres: biophysical and ecological, temporal and cyclical, distributional and relational, and anthropogenic (Mehta, 2000; Mehta, 2007). Mehta makes two basic distinctions of scarcity: real and manufactured. Real scarcity is fundamentally a matter of low physical supply, an environmental problem. Manufactured scarcity originates from human demand and overuse. Using the International Water Management Institute's (IWMI) scarcity indicators and analysis, Rijsberman is careful not to apply labels too quickly; he suggests that countries unable to meet their water demands *after* undertaking adaptive measures are physically water scarce. Economically water scarce countries are those that do not invest in adaptive measures and infrastructure to make water available (2006: 8-9). Mehta attributes water shortages to a lack of institutional incentive to invest in infrastructure. She further contends that scarcity may be discursively constructed for political purposes to naturalise it as a permanent reality so as to justify large infrastructure projects, or the like (Mehta, 2000; Mehta, 2007). Saleth and Dinar, on the other hand, attribute scarcity to inefficient use and mismanagement rather than physical limits of water (2004: 1).

For this paper, scarcity refers to the real and manufactured limitations to ground and surface water, and the limited number of associated water rights available to these resources.

## 3.2 Theoretical Background

### *Water Property Rights Systems*

Property rights (PRs) regimes may be public, private, or common in nature, while allocation institutions are based in user, agency, or market allocation systems (Bruns et al., 2005: 7). PRs regimes are backed by the state and legitimised by the institutional framework at national and local levels. Rights will be only as strong as the institutions. The short-term and long-term security provided is important for lowering risk and attracting investment into water-intensive productive activities and improve water efficiency to conserve the resource (Bruns et al., 2005: 6; Dye, 2006: 195-196; Solanes and Jouravlev, 2006: 338). If a government or issuing agent is weak or prone to renege on its commitment to protect property rights, there is little incentive for rights-holders and buyers to invest, and the system will ultimately fail to produce positive results (Bruns et al., 2005: 7, 30).

Beyond national and local governments and institutions, PRs depend on the legitimacy and respect endowed at the social and individual relations level, as

mentioned previously they are both legal *and* social. Rights based on law must be seen in relation to their concretised form as expressed in social relationships between water users and rights holders, depending on social class, gender, ethnic, and land tenure relations that may further define one's access to water. PRs must be legitimised by an external body. Without this, the claim over the resource is empty (Roth et al., 2005: 241-242). Despite trends to privatise, water is still conceptually a 'commons' that both takes in and gives back from itself based on user behaviour. Individual behaviour, then, affects how social goals are achieved through using water resources and, conversely, how goals for water resources are achieved (Zegarra, 2002: 9). Water management and strategies—through institutions—try to restrict the degree to which individual choices affect the operation negatively through transaction costs and information.

### *Why Markets for Water Rights?*

The founding principle for water markets is the concept of water as an economic good that can be commoditised, priced, and traded (Donoso and Melo, 2004). The common argument for private water markets is based in the economic efficiency of market mechanisms to allocate scarce goods and services. The rationale for a PRs system is for market forces to govern the resource, to prevent abuse of the commons, and to create investment incentives to enhance productivity (Hackett, 2006: 216).

The key is efficiency, which is optimal use at minimal waste, or where participant welfare is maximised as measured by consumer and producer surplus (Ellis, 1992; Hackett, 2006). Inefficiency, otherwise known as market failure, is anything less than complete optimal allocative efficiency by the market (Hackett, 2006; Perman et al., 2003). On a different note, technical efficiency is water production that minimizes waste and loss from the water supply system (Bakker, 2001). In irrigation, technical efficiency is the worry of the irrigator, who shoulders the cost of water and physical infrastructure.

Market instruments require strong property rights to provide legal protection and legitimacy to extract a certain volume. PRs rationale is rooted in the principle to avert the 'tragedy of the commons' by confronting resource users with the costs and benefits of their actions. PRs are to encourage owners toward better stewardship because the right entitles them to its profits and benefits. When one's own wealth is at stake, it gives incentive to maintain and improve what is owned (Anderson and Leal, 2001; Hardin, 1968). This requires that PRs are clearly defined, enforced, and transferrable (Anderson and Leal, 2001: 22).

Markets are made up of buyers and sellers seeking gains from trade, whose trade and communication are mediated by institutions (Hackett, 2006). Hackett

(2006: 39-40) suggests that for a competitive marketplace of property owners acting out of self-interest to reach efficiency which brings aggregate benefits to society, the following requirements must be in place:

1. Well-defined and enforceable property rights;
2. Market institutions to mediate between buyers and sellers, prices and trade terms;
3. No buyers or sellers can dominate through monopolistic or collusive power;
4. Positive and negative externalities, and costs of market entry and exit are kept at a minimum;
5. Transaction costs must be low enough that transactions are acceptable to both parties;
6. Information about the quality, availability, pricing, and location of water must be at a low cost (Hackett, 2006: 40)

Applied to water for agriculture, market prices incentivise technical efficiency on the part of farmers while market allocation secures transfers from low-value to high-value use. Logically, water should transfer from from inefficient irrigators to efficient irrigators or from inefficient sectors like agriculture to more efficient and valuable sectors like hydropower. The system is meant to increase efficiency, conservation, and economic returns to water by confronting water users with opportunity costs in buying and selling. Production and financial gains are concentrated amongst irrigators of high-value crops (Bjornlund and McKay, 2002; Budds, 2004; Hearne; Solanes and Jouravlev, 2006). Drawbacks of and hindrances to water market allocation include third-party externalities, transaction and decision costs, commitment and agency (Bruns et al., 2005: 11, 29).

### *The Neoliberal Assumptions behind Water Markets*

The neoliberal program in Chile was based on private liberty, property rights, and market principles (Budds, 2009a), forming the backdrop for the 1981 Water Code. Technocratic criticisms of centralised water regulation underpin and justify decentralising water management to markets. Key assumptions behind water markets as efficient allocation mechanisms underlie this support for a decentralised system. These assumptions are in two groups. The first group is for the assumptions about how water markets will work and why they will lead to the best allocation. The second is for the assumptions about how different groups of water users will fare using these rights, specific to Chile.

- First, the foundational assumption implicit to the water market system is

either directly or indirectly in all the cited water market literature for this paper. It is, quite simply, that efficiency is the *best* allocation.

- Second, the market is the best manager of a scarce natural resource. Unlike the state, markets are deemed the most efficient institutions to use prices to determine rational, cost-effective, high-value allocations. Practically speaking, capital markets are better equipped to assess water institutions than are state bodies. This alleviates the state of its distributive role. Markets allow the forces of supply and demand to regulate, distribute, and transfer rights, driving transfers to high-value and productive uses (Bakker, 2001; Bauer, 2005; Hearne and Donoso, 2005).
- Third, creating water rights and a market for a scarce resource will result in many and frequent market transactions with the facilitation by functional institutions (Galaz, 2004: 417).
- Fourth, removing the information gathering burden from the state to place it on individual water users will alleviate the asymmetry of information common in a centrally planned system (Donoso and Melo, 2005: 9). Information is expensive for centralised water agencies to collect, so it is assumed that the decentralised nature of water markets will disperse the information-gathering process to be carried out by the people that will benefit from it. Thus, information like market prices, for example, will be effective informants more accessible to users, less expensive to attain, and so, more equitable. This includes the economic theory assumption that price signals are effective informants to trigger markets toward allocative efficiency (Easter and Hearne, 1994: 9-10).
- Fifth, in his early work the economist Coase proffered that a competitive, efficient market will be a costless one "that maximises aggregate income regardless of the institutional arrangements" (North, 1995: 19). In other words, an efficient water market allocation will not incur transaction costs.
- Sixth, the equality of markets and equality of actors together assume the market is an equal playing field and thinks of water users as homogenous. This is based on a view of markets as politically-neutral and without one central controlling force (Galaz, 2004; Hadjigeorgalis, 2009 Romano and Leporati, 2002).

The follow assumptions, also neoliberal in nature, are specific to the Chilean context. These are not due to the design of the Code itself, but an interaction between deficiencies in a market-based allocation system and pre-existing socio-economic inequalities:

- Seventh, a well-function market system based on private PRs promotes

cooperation and social respect for others' properties; where violations do occur, actors may equally access fair and impartial dispute settlement procedures through WUAs and local courts (Galaz, 2004).

- Eighth, private water markets are poverty-alleviating, lead to public budget savings, and alleviate the water burden from taxes. Because government deficits and subsidies are due to investments in technically inefficient state-owned irrigation infrastructure, when the private sector takes up this responsibility it frees up tax–based budget resources to be redirected toward those 'left out' by the market (Easter and Hearne, 1994; Romano and Leporati, 2002; Schleyer and Rosegrant, 1996). Thus, the price recovery expected from private investment in infrastructure is more effective than the freely-delivered, state-determined portion of water (Donoso and Melo, 2005: 8). In addition, the extra monetary resources may support just, social development and poverty alleviation. This is by letting the poor use PRs as collateral for credit; redirecting revenue from water pricing toward pro-poor policies; generating more surplus water for the poor due to water efficiency; and breaking the state's favouritism toward the wealthy (Budds, 2004: 323; Romano and Leporati, 2002).

### *Theorising Water Markets through New Institutional Economics*

NIE theorises that the marketplace is the juncture of overlapping agents, structures, and forces: institutions, scarcity, competition, property rights, rationality, and information. Where is departs from earlier neoclassical theories is in the recognition that information is not perfect, nor is it perfectly understood within the limits of human rationality; bargaining strengths are not always equal; and, amending what economist Ronald Coase originally contended, transactions are not costless (Ménard and Shirley, 2008; North, 1995). It is in these departures from the neoclassical theories that NIE is a useful tool for understanding how water markets fulfil assumptions of efficiency for different groups.

Institutions are socially embedded structures and established informal and formal rules that are subject to social and/or legal enforcement which provide stable structure to daily life. Institutions are needed to reduce human uncertainty due to incomplete information and limited mental capacity to process all information; they incentivise agents to act and—together with technology—determine costs of production and exchange (North, 1990). To best benefit economic development, institutions must be flexible, able to change and adjust to social norms and informal rules (North, 1995). Institutional organisations, like water user associations (WUA), are political, social, or economic groups of

individual agents bounded together to achieve common objectives, and to create and implement markets. The hierarchy of power in the institutional structure shapes and perpetuates politically-directed economic markets (Ménard and Shirley, 2008; North, 1990; North, 1995).

Competition for limited or scarce goods decreases transaction costs, while PRs provide legally defined structure which improves institutional capacity to moderate transactions (North, 1995; Ménard and Shirley, 2008). This discloses one prominent value in NIE, namely, to prioritise efficiency. The institutional arrangement is meant to facilitate efficiency through low transaction costs and reduced uncertainty of the competitors. According to the previously mentioned definition of allocative efficiency, this transaction will place the resource to its optimal use, where technical efficiency will minimise waste and the user will put it to highest-value production (North, 1995).

What NIE proffers about the bargaining strength of competitors is that:

> "…the formal rules, are created to serve the interests of those with the bargaining power to create new rules…in a world of positive transaction costs it [bargaining strength] does—and it thus shapes the direction of long-run economic change" (North, 1995: 20).

This statement edges toward the *problematique*: institutional functions are swayed and rules are created by those with bargaining power. Yet, institutions are purposed to assuage uncertainty by lowering transaction costs through information and PRs. The bargaining strength that helps in forming the rules also helps in controlling an actor's own transaction costs. This bargaining strength, then, can be an attribute of the most economically viable water users, those who are most able to put the scarce resource to highest-value use.

From an institutional perspective, Mackintosh (in Akram-Lodhi, 2008: 25) premised that markets operate on four principles, which are asserted here to contribute to the differences in the ability of groups to benefit from water markets. These four characteristics are: terms of entry; differential shares in means of production influences on markets; merchant capital; and non-market interventions. In terms of water allocation systems, first, differences in wealth implies inequality and creates differentials in market entry positions; high entry positions of dominant groups who control wealth and productive inputs means they more easily regulate markets as well. Second, owning disproportionate shares in the means of production can abet one's influence over the conditions of the market, namely in the information, rationality, and uncertainty. Third, merchant capital flows from sources like the fruit-sector transnational corporations (TNC) and business conglomerates facilitate the movement of market goods along the

nodes of commodity chains, linking production and consumption systems. Finally, non-market actors, like the state or firms, may seek to influence resources allocation to better facilitate high-value use that will indirectly benefit them. These four principles each depict a different dimension of bargaining strength which actors use as economic agents to maximise their benefits via information to decrease transaction costs, gaining competitive advantage over others. This set of characteristics of markets by Mackintosh reaffirms by its very scope that markets, and those who engage in them, are anything up homogenous, and steeped in the inequalities often present in agrarian structures in developing countries.

In summary, neoliberal water reform considers water a scarce good that must be priced and commoditised for socially optimal allocation between competing users. According to an NIE perspective, economic transactions are choices amidst socio-economic constraints and competition for scarce resources, driven by rationality, moderated by institutions, and inevitably imbued with transaction costs as a consequence of production and information imperfection. Institutions are meant to reduce this uncertainty and transaction costs, but as North has provided, they are often controlled by the will of those with bargaining strength. Bargaining strength may be directly linked to the exercise of water users' economic resource base, and knowledge of and access to formal water organisations within the larger institutional framework. Finally, based on this chapter, it may be surmised that in a market allocation system, economic rationale trumps social equity, and that an efficient allocation does not require equity. The following chapter describes the 1981 Water Code that put these principles into practice.

# Chapter 4 The 1981 National Water Policy of Chile

This chapter gives an overview of the intertwined histories of land and water reform, followed by the key features of the 1981 Water Code. This chapter provides background for understanding how along with many liberalising measures the state-led land reform[2] (SLAR) and the market-led water reform fundamentally restructured productive social relations, opening up the agrarian class structure to newcomers.

## 4.1 Hand in Hand: The Agrarian and Water Reforms

The goal of Chile's SLAR was to channel landless peasant labour into agricultural productivity by redistribution of unused, unproductive lands of *haciendas* and *latifundias*—the estates the 1967 Agrarian Reform Law 16.040 defined as more than 80 basic irrigated hectares (BIH). A new water law that assigned water according to land size-based crop water requirements (Bellisario, 2006; Van Koppen et al., 2007). Land and water were legally separated; water was expropriated, declared public property and fell under the allocation of state planning (Bauer, 1997; Hearne and Donoso, 2005).

Recognising that the land and water rights systems were major setbacks to development, Christian Democrat President Eduardo Frei began land expropriations in 1964. This was followed in 1970-1973 by Popular Unity government President Salvador Allende who extended the scope of estates to be expropriated to 40-80 BIH (Murray, 2003). The tumults of land tenure under reform motivated further protection of water rights, bringing private property discussions onto the political agenda in the 1970s (Bauer, 1997: 642).

Under Augusto Pinochet, who wrested control from Allende in 1973, agricultural productivity was sought by dismantling import substitute industrialisation and aiding the fruit, fishery, and forestry sectors to expand natural resource and NTAE (Kurtz, 2001). In 1973 began the Agrarian Counter-Reform, in which the newly staffed Agrarian Reform Corporation (CORA) redistributed 41% of the expropriated land to 54,564 peasant families. Numerically, this was

[2] See Annex 1 for a more complete background to the Agrarian Reform

65,000 new land units created from an original 5,800 estates. As 59% of Chilean agricultural land, this redistribution essentially sustained the emergence of a new agrarian capitalist class, namely the 37,405 who received parcels averaging 10 BIH. As for the rest of the land: 33% of total land returned to original owners and the rest to various public institutions and private groups (Bellisario, 2006: 171, 199; Bellisario, 2007a: 20-25). Bellisario asserts that if this land had been put to use under the 36,000 possible recipient peasant families or into cooperatives of reformed and un-reformed *campesinos*, the agrarian development path may have been a capitalism "from below," built by and drawing peasants rather than by mid- to large-scale farms (Bellisario, 2007b). In the end the 'counter-reform' was akin to a reconstruction of a new rural bourgeoisie in a context of transformed social and technical relations (Bellisario, 2007a: 25) that was foundational to catalysing economic development through NTAE.

Under Pinochet, the commercial, export-market oriented policies brought deliberate structural change to push rapid production which placed a premium on efficient and flexible allocation of water, land, and other resources in order to cope with agriculture's changing demands in the face of international competition (Schleyer and Rosegrant, 1996: 34). The 'basics' of an ideologically neoliberal water reform driven by "decentralized decision-making, private property rights, and markets" were implemented (Boelens and Zwarteveen, 2005: 735), privatising state enterprises and increasing private sector investment into more efficient irrigation systems (Hearne and Donoso, 2005).

## 4.2 Features of the 1981 Chilean Water Law

The 1981 Water Code strengthened legally enforceable private property rights to water which had been established by the 1980 Civil Code and legally separated water from land. This enabled a system of constitutionally and legally protected permits, fully transferrable within and across water use sectors which were conditions for the emergence of spot water markets and water rights transfer markets (Bauer, 1997; Bauer, 2005; Galaz, 2004; Hearne and Donoso, 2005; Van Koppen, 2007). In order to be bought, sold, or mortgaged, PRs must be registered at real estate title offices (Bauer, 1997; Bauer, 2005, Galaz, 2004).

All rights have volumetric and definitional parameters. Extractions are to be in proportion to environmentally available flows, and rights to return flows are maintained by the district (Schleyer and Rosegrant, 1996: 37). The Code distinguished between consumptive and non-consumptive uses, and surface and groundwater. Consumptive rights allow for complete consumption, not requiring water to be returned to the stream flow, mainly used in agriculture or households.

Non-consumptive rights—used especially in hydroelectric generation—require water return. Furthermore, the Consumptive and Non-Consumptive rights are further classified (Bauer, 2005; Donoso, 2006; Galaz, 2004; Hearne and Donoso, 2005).

The 1981 Code departed from the rule of beneficial and effective use, common to other water markets in Australia and the south-western United States (Bjornlund and McKay, 2002). This rule indicates that water be apportioned according to the amount needed for optimal and efficient use of given flows out of interest for the public good (Dourojeanni and Jouravlev, 1999: 16). The absence of preconditions for rights application, the payment-free rights assignation, and corruption gave rise to speculation and hoarding trends from 1981. This barred competitors from entering the market, inhibited effective or highest-value use, and disadvantaged those without administrative knowledge and socio-economic power to compete or stop it (Bauer, 1997; Bauer, 2005; Solanes and Jouravlev, 2006).

Moreover, speculation was unhindered until the 2005 Amendment, as rights-holders were not obligated to use their rights or to pay a fee on unused rights (Bauer, 2005: 151). Likewise, the absence of water scarcity, scarcity-induced price signals, and penalties for unused water rights has given little incentive to sell rights (Solanes and Jouravlev, 2006: 339). Today, the water sector faces increasing manufactured water scarcity. An example is the formerly-government owned hydroelectricity company ENDESA that held 46% of non-consumptive rights in 1997, but left 58.8% unused. In contrast, in 1997, only 0.45% of consmumptive water rights were available (Dourojeanni and Jouravlev, 1999: 18)

### *New Rights*

The Guide to Requesting Water Rights[3] outlines application procedures for new rights which may be attained by application or claiming 'original rights' with the DGA, by bidding for new or surplus water, or by outright purchase on the market (DGA, n.d.; Schleyer and Rosegrant, 1996: 36). The notice of application must be publicised in the Official Journal of the Republic (*Diario Oficial)* within 30 days of submission, in the newspaper corresponding to the water right's locality, as well as through regional radio stations. Opponents may contest the application in writing within 30 days of the last publication (DGA, n.d.; Donoso, 2006). Requests for

[3] Spanish Title: *La Guía para la Presentación de Solicitudes de Derechos de Aprovechamiento de Aguas.*

new rights must be granted in the absence of conflicting use by other rights-holders and as long as there is water available (Bauer, 1997; Bauer 2005; Hearne and Donoso, 2005). Where there are simultaneous requests for the same rights, they are auctioned to the highest bidder (Galaz, 2004).

### *Amendment to the 1981 Code*

Since 1990, there have been several proposals for legal and policy amendments, the first two blocked. The set of proposals in 1996 called for an annual license tax to be placed on unused portions of water rights to discourage for speculation and hoarding. This was debated until the eventual amendment in 2005[4] (Bauer, 2005; Budds, 2004; DGA, 2005; Donoso, 2006; Hearne and Donoso, 2005).

### *Registration*

In 1975, the government froze the actual use of water to establish a base for assigning water rights (Schleyer and Rosegrant, 1996: 36), and declared that anyone using existing water rights at the time was presumed to be the rightful users (Bauer, 1997; Van Koppen et al., 2007). The Water Rights Register of the Real Estate Title Office, water user associations, and the DGA each keep records of water rights, but none is comprehensive (Bauer, 1997; Donoso and Melo, 2004: 13). By the end of the 1980s, only about 40% of water users had formal rights (Zegarra, 2002: 27).

Unregistered rights have constitutional protection commensurate with registered rights, making the incentives for undertaking the process unclear. While there is the incentive to register water rights for further recognised protection by the state, it is estimated that 60-90% of all water rights are not registered (Bauer, 1997: 641; Van Koppen et al., 2007: 57-58). The incoherent nature of water cadastres makes possible that new conflicts may arise between new and old water users, or from the ambiguity of unregistered or historic rights' volume and use parameters.

For regularising historic water rights, there are two processes: one is to apply to the local civil court with a DGA technical report supporting the continuous use of water since 1976; the other is to request formal recognition for water originally affiliated with agrarian reformed land at the time of the 1981 assignation (Budds, 2009b: 47). The challenges to registration for historic rights holders have proven

[4] See Annex 2 for several other important changes in 2005

too great for many, which is especially problematic when selling traditional rights with ambiguous and poorly estimated extraction volumes that generate externalities for others when more is extracted than should be. Their portions are encroached upon, or the spillover users' flows are reduced by water transfers or rights sales to more efficient users (Bauer, 1997, Donoso, 2006).

Another equity challenge is for spillover users who rely on the portions of water that are "unused or abandoned by their owners" and left to flow over or underground (Donoso, 2006: 164). While these users do not hold formal rights to spillovers, they depend on them; so when upstream users moderate their use or sell, the flows are greatly diminished. The same users, without security of tenure, cannot guarantee they will reap benefits from their own infrastructure improvements. This externality of the free exchange of water was not foreseen, but results from efficiency itself and thus as a criticism cannot be levied against the allocation system's ability to meet its own objections. It can, however, be criticised in terms of the market mechanisms' social effects on social actors who do not have the access to capital or credit, and who are overlooked by institutional or infrastructural networks.

## *4.3* Institutions and Registration: Foundations for Water Markets

According to NIE, the institutional context determines which and how transaction costs are borne by actors. Because of the privatised nature of the water sector, individual PR holders form the basis for institutional change (Saleth and Dinar, 2004). With these social origins, institutions face challenges in commitment and agency that threaten the smooth working of an allocation system and property rights regime. The first, commitment, is to keep an agreement despite opportunities to violate it. The ease of violation grows with the vertical or horizontal social distance between those undertaking the agreement or commitment to collective action (Schlager in Bruns et al, 2005). The second problem is agency, in which a rights holder may choose to exercises authority of property rights bundles in such a way that it undermines the authority of others to exercise rights (Schlager in Bruns et al, 2005: 33). This includes activities like digging illegal wells that encroach upon the legal groundwater rights of others, or siphoning water off an irrigation line, reducing the flow for others. These two social-relational dimensions of PRs and regimes necessitate institutions to organise water users and enforce rules and procedures for market exchanges.

### *Public Sector Institutions*

The role of the State in water rights and use regulation is to measure and determine water availability and maintain databases on such information; regulate water use to avoid third party externalities; and to carry out environmental impact assessments for the sake of water conservation and protection (Donoso, 2006: 161). The DGA, under the Ministry of Public Works (MOP), is responsible for gathering and maintaining hydrological data, enforcing rules, inspecting large water works, planning water development and exploitation, maintaining cadastres of water rights and WUAs, and granting rights for surface and ground water not previously claimed (Bauer, 1997: 641; Hearne, 1996: 189). Other than the DGA, public institutions, largely in the agricultural sector, are highly influential on farmers' overall ability to access or use water rights especially through infrastructure investment and credit provision.

### *Private Sector Institutions*

Water user associations (WUA) coordinate collective action and cooperation to provide monetary and labour contributions to maintain irrigation infrastructure, so that increased private input will increase productivity (McCarthy and Essam, 2009: 5). Contributions depend on economic factors among heterogeneous users by household, community, or water community levels. Unfortunately, the willingness to act does not always translate into the ability to act as a contributor (and thus a receiver) of the benefits of the WUA, specifically because of the various factors of financial resources, knowledge, human capital, and productive relations.

The 1981 Chilean Water Code stipulates that when two users hold rights to the same source (river, dam, channel, underground water, etc) it de facto establishes an association between them. WUAs are legally recognised private groups, owned and operated by members with fees based on capital and operating costs which they regulate. First they study, finance, and implement projects for developing water sources as a productive input; and second, they are responsible for the distribution of water, as well as constructing, maintaining, and managing necessary infrastructure necessary (Donoso, 2006: 161).

The complexity of rules and protocol rise relative to the size of the water source or irrigation infrastructure that the specific association deals with directly. *Communidades de Agua* (CDA) distribute water, maintain secondary and tertiary irrigation channels, and collect fees for *Associaciones de Canalistas* (ADC) and higher-level institutions. The *Juntas de Vigilancia* (JDV) monitor and direct the technical distribution of water flows. CDAs and JVAs oversee distribution of water into canal serving CDAs and maintain primary channels and distribution from large

bodies (streams, reservoirs, lakes). A CDA may be part of an ADC, which may in turn be part of a JDV making it a de facto member of a JDV; or where a CDA receives water directly from a main canal or secondary channel it will be directly part of a JDV. Some CDAs receive water directly from spillovers or rivers and streams, and are not linked to either an ADC or JDV. When CDAs are members in an ADC or JDV they are formally recognised as WUAs. Members of CDAs not registered in a JDV are shown to benefit less from their investments in the maintenance of water infrastructure (Hearne, 1996; Hearne and Donoso, 2005; McCarthy and Essam, 2009; Schleyer and Rosegrant, 1996). Each irrigation organisation has an elected directorate. Member voting power is proportional to number of held water rights, making small and marginal farmers are typically underrepresented or unrepresented. The directorate is responsible for collecting and using the tariffs (levied per share) from the farmers for water distribution and canal maintenance (Zegarra, 2002: 42). What this indicates is that without formalising traditional rights or registering rights, thus being absent from JVAs, one is outside the formal water system and unprotected by the structures of water governance.

In a study in Maule, Region VII, 54% of CDAs held official membership status in local JDVs, which directly influences household level decision-making for labour and monetary support for the CDA, as well as the information and technical services of the JDVs. The study shows that not belonging to a JDV actually raises the opportunity cost of labour for members of a CDA that are not members of a JVA, and lowers net revenues. The costs of registration are, in part, compensated by the benefits of formal WUA membership. Membership size and heterogeneity are the most critical factors affecting collective action in WUAs (McCarthy and Essam, 2009).

In summary of this chapter, the agrarian reform restructured social relations based on land tenure. It broke landowners' monopoly on land, spearheaded a land market that helped found capitalist agriculture, and expropriated land from inefficient *latifundia* to productive peasants. Considering reform and counter-reform, the small-scale (0-5 ha) sector fell in land area though increased in number, while all others grew (Gomez and Echenique, 1988). The growth of medium- to large-holding agriculture aligns with the national focus on economic growth in the NTAE in forestry, fisheries, and fruit. The water reform in 1981 aided this agricultural restructuring by establishing private property rights and transferability to stimulate private investment into maintaining irrigation infrastructure and water rights trading. Transaction costs are lowered through formal membership in WUAs that provide the organisational coordination of labour and capital contributions from registered water users for constructing, maintaining, and managing irrigation infrastructure.

# Chapter 5 The Chilean Context: Water and Agriculture

This chapter is meant to provide the general agricultural, and specifically fruit production, background of Chile. This begins with a brief introduction to water use in agriculture in Chile, a brief look at agrarian groups, and then an introduction to Chile's fruit sector as a large consumer of water.

## 5.1 Water in Chile and its agricultural production

It is important to premise this chapter with a brief picture of Chile's water use. Chile's annual per capita water withdrawals in 2002 were estimated at 795 $m^3$/yr; since the threshold for water scarcity is <1,000 $m^3$/yr/per capita, this categorically makes Chile water scarce (FAO, 2009; Bates, Kundzewicz, Wu and Palutikof, 2008: 8). Chile has been experiencing declining trends in yearly precipitation of -50% over the last 50 years (Bates et al, 2008: 16). This scarcity increase will exacerbate the pre-existing challenges to groundwater rights and extractions, as well as surface water rights of which less than 5% are still available (Budds, 2004). Likewise, the water-rich areas are in the sparsely populated south that produces forest products, dairy, cereals, and root vegetables while the centre (*Centro*) and into the north (*Norte Chico*) are particularly dry and dependent on irrigation. Hydropower, export agriculture, and industry are concentrated there (Hearne and Donoso, 2005). These productive sectors are most vulnerable to the expected future water shortages, placing further trust in the water institutional and regulatory framework.

As of year 2000, Chile's water withdrawals for agriculture accounted for 64% of water use, but total withdrawals only 1.4% of total internal water sources (FAO, 2005b), a distinction which emphasises the localised and specific geographies of scarcity. The dismal irrigation efficiency rate of 25-30% in traditional agriculture calls for increased investment in irrigation technologies and improved infrastructure (Bauer, 1997: 649).

## 5.2 Current Agrarian Groups and Agricultural Production: A Focus on the Fruit Value Chain

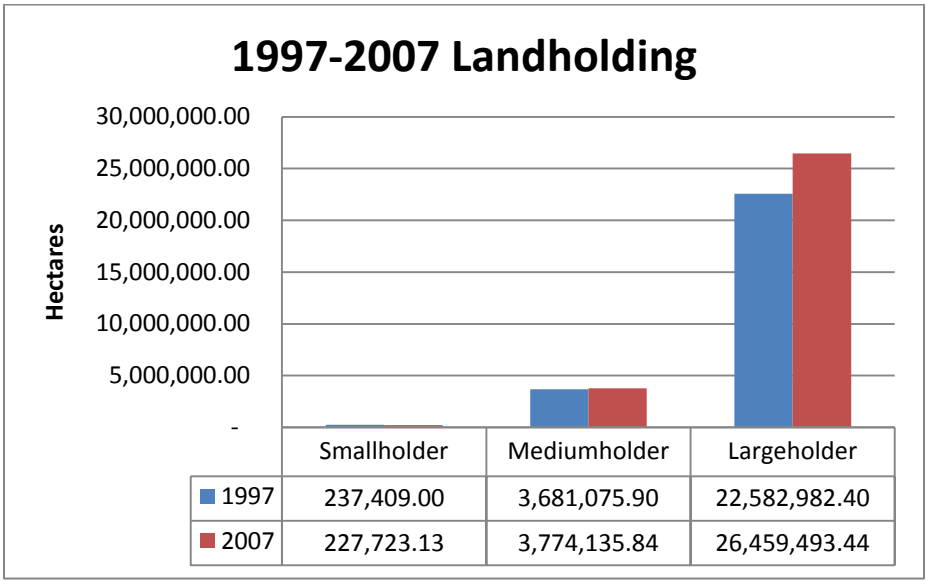
The productive relations and conditions in rural Chile have long been tied to land

tenure. Land tenure can be a key factor in the agriculturalists' bargaining strength to acquire water rights.

The Organisation for Economic Co-operation and Development (OECD) summarised changes in landholdings by agricultural group, categorising the groups according to producer association. Overall, between the 1997 and 2007 censuses farm numbers decreased by 8.6%. Individual producers fell in number -11% and in hectares by -10%. Associated producers, who do not hold legal contracts, grew numerically by 4.3% and fell -44% in hectares. Corporate farms, which are companies or social groups with legal contracts, grew in number by 54%, and in land by 54% (OECD, 2009: 73). According to land-based categories of smallholders (0-5 ha), mediumholders (5-100 ha), and largeholders (100+ ha), Figure 1 shows that the smallholder group experienced the only loss between 1997 and 2007 while the other two have grown. This infers the growth in large, agribusiness land holdings. Furthermore the average hectares held per land holding increment from 1997 to 2007 (Table 1) have changed little, except for a slight increase in the <1 ha holdings, and a rather significant increase in the >2000 ha holdings.

**Figure 1**

**Total Land Held per Producer Group, 1987-2007**




*Source*: Chile INE, 1997 and 2007

**Table 1**

**Average Hectares per Land Holding Increment, per Census 1997 and 2007**

| avg. ha. per holding | <1 | 1 to 5 | 5 to 10 | 10 to 20 | 20 to 50 | 50 to 100 | 100 to 200 | 200 to 500 | 500 to 1000 | 1000 to 2000 | >2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1997 | 0.497 | 2.47 | 7.08 | 14.02 | 31.16 | 68.75 | 137.67 | 306.58 | 690.06 | 1382.16 | 10150.14 |
| 2007 | 0.517 | 2.47 | 7.05 | 13.98 | 30.98 | 68.96 | 138.08 | 305.88 | 687.76 | 1374.77 | 14505.56 |

*Source*: Chile INE, 1997 and 2007

Bellisario (2007b) distinguishes four agrarian groups:

The first group (see Table 2) is concentrated in the Central Valley, engaged in profitable agricultural production (e.g. fruit exports) as well as dairy, meat, and grain production in various regions (Bellisario, 2007b). These producers are connected with private and public intermediaries that link farm production, global processing, and global distribution and retail systems (Akram-Lodhi, 2008: 32). Census data shows increases in agricultural land under the control of largeholders in Regions II, III, IX/XIV.

The second group, the rural middle class of "petty commodity producers", includes capitalised farmers providing for urban markets (5.2% of total farms and 12% of land) and urban-residing professionals providing services to rural sector (Bellisario, 2007b: 171). This class equates to mediumholders (see Table 3), holding between 5 and 100 ha. Region VI has expanded greatly, while most regions are falling in holding numbers and rising slightly in agricultural hectares.

The third group is traditional farmers and family peasants. Within this group were the 8% of family peasants who were beneficiaries of the Agrarian reform that became successful contract-producers for fruit-export companies. Many others lost access to their land (Bellisario, 2007b: 171).

The fourth group, considered the agrarian proletariat, are mainly landless and engaged in agricultural wage labour (Akram-Lodhi, 2008: Bellisario, 2007b). The agricultural labour force under employment of large producers is absorbing many of the 'de-peasantised' as well as a growing seasonal migrant labour force that is increasingly feminised (Barrientos, 1997; FAO, 2009).

These last two of Bellisario's groups are smallholders (0-5 ha) (See Table 4) engaged in agriculture as small-scale farmers (SSF) or wage labourers. This group, holding 1% of agricultural land, is undergoing loss, decreasing in population and land area (ha) each by 10,000. This group produces for household consumption, a little for local markets, and contributes to the rural non-farm economy and labour-intensive agriculture (Akram-Lodhi, 2008). A study of agricultural growth in the 1990s shows subsistence farming is estimated to be 1.4% of the working population; and non-farm income contributes up to 41% of rural income (López and Anríquez, 2004: 21).

The indigenous Chileans[5] must be recognised as an important but small percentage of the total population, mostly falling into the smallholder category. While not a large focus in this paper, the issues of land and water tenure for indigenous livelihoods are highly contentious in political and social debates, and provide strong arguments for legal pluralism and communal resource management seen in academic literature (Boelens, 2003, 2009; Budds, 2009b; Gomez and Echenique, 1988).

[5] See Annex 3 for table of original communities in Chile, according to land and population by Region.

**Table 2**

**Largeholder (100 ha to >2000 ha) Land Area by Region**

| Regions | 1997 | | 2007 | | change (%) | |
|---|---|---|---|---|---|---|
| | holdings | ha | holdings | ha. | holdings | ha |
| **I and XV*** | 343 | 871,890.80 | 261 | 508,989.87 | -24 | -42 |
| **II** | 17 | 34,938.80 | 19 | 370,319.67 | 12 | 960 |
| **III** | 129 | 2,014,227.20 | 155 | 3,754,576.03 | 20 | 86 |
| **IV** | 754 | 3,766,079.00 | 930 | 3,893,045.58 | 23 | 3 |
| **V** | 949 | 1,241,896.10 | 828 | 992,872.81 | -13 | -20 |
| **RM** | 931 | 1,059,674.50 | 845 | 1,005,493.28 | -9 | -5 |
| **VI** | 1394 | 996,498.10 | 1285 | 877,919.02 | -8 | -12 |
| **VII** | 2563 | 1,705,432.00 | 2098 | 1,454,546.54 | -18 | -15 |
| **VIII** | 3202 | 1,835,165.40 | 2225 | 1,158,808.57 | -31 | -37 |
| **IX** | 350 | 1,509,178.30 | 2992 | 1,176,883.34 | 755 | -22 |
| **X and XIV**** | 5430 | 2,112,074.10 | 4289 | 2,708,280.69 | -21 | 28 |
| **XI** | 1656 | 1,515,763.80 | 1778 | 3,206,801.89 | 7 | 112 |
| **XII** | 570 | 3,920,164.30 | 655 | 5,350,956.15 | 15 | 36 |
| **Regional totals** | 18288 | 22,582,982.40 | 18360 | 26,459,493.44 | 0 | 17 |
| **National totals** | | 26,502,363.00 | | 29,781,690.81 | | 12 |
| **Region % of total** | | 85.21% | | 88.84% | | |
| **Avg. size.** | | 1234.852493 | | 1441.14888 | | |

* Regions I and XV are treated together, as Region XV was created in 2007 out of Region I.

** Regions X and XIV are treated together, as Region XIV was created in 2007 out of Region X.

*Source*: Author's calculations based on Chile National Institute of Statistics 1987, 1997, 2007.

**Table 3**

**Mediumholder (5-100 hectares) Land Area by Region**

| 5-100 ha. | 1997 Census | | 2007 Census | |
|---|---|---|---|---|
| Regions | holdings | ha. | holdings | ha. |
| I and XV* | 1,174.00 | 19,446.50 | 1,372.00 | 21,787.39 |
| II | 287.00 | 3,394.20 | 195.00 | 2,052.73 |
| III | 703.00 | 14,504.80 | 629.00 | 12,629.54 |
| IV | 5,607.00 | 98,248.70 | 4,784.00 | 109,552.05 |
| V | 6,669.00 | 133,412.40 | 5,499.00 | 246,153.31 |
| RM | 6,885.00 | 138,287.10 | 5,617.00 | 121,552.09 |
| VI | 11,908.00 | 266,810.60 | 27,665.00 | 742,921.58 |
| VII | 21,259.00 | 496,174.10 | 17,807.00 | 408,722.93 |
| VIII | 31,183.00 | 746,971.30 | 27,266.00 | 580,284.61 |
| IX | 37,067.00 | 808,090.10 | 34,225.00 | 716,390.37 |
| X and XIV** | 36,918.00 | 920,445.20 | 32,254.00 | 762,637.90 |
| XI | 733.00 | 30,672.90 | 1,139.00 | 43,558.70 |
| XII | 241.00 | 4,618.00 | 270.00 | 5,892.64 |
| Regional total | 160,634.00 | 3,681,075.90 | 158,722.00 | 3,774,135.84 |
| national totals | | 26,502,363.00 | | 29,781,690.81 |
| as % of national | | 13.89% | | 12.67% |
| Avg. size | | 22.92 | | 23.78 |
| % Change | | | 1997 to 2007: | 2.53 |

* Regions I and XV were one region prior to 2007

** Regions X and XIV were one region prior to 2007

*Source*: Chile INE, 1997 and 2007

**Table 4**

**Smallholder (0-5 hectares) Land Area by Region**

| Regions | 1997 | | 2007 | |
|---|---|---|---|---|
| | no. | ha. | no. | ha. |
| I and XV* | 4,175 | 5,670.00 | 3,166 | 4,433.96 |
| II | 1,737 | 2,378.00 | 1,707 | 2,161.01 |
| III | 1,608 | 2,567.00 | 1,906 | 3,072.70 |
| IV | 10,948 | 16,770.00 | 9,407 | 15,942.15 |
| V | 12,692 | 17,667.00 | 9,404 | 15,530.40 |
| RM | 7,863 | 12,629.00 | 5,093 | 9,214.60 |
| VI | 17,802 | 23,797.00 | 11,734 | 18,057.76 |
| VII | 16,819 | 29,740.00 | 18,460 | 30,695.04 |
| VIII | 22,567 | 44,773.00 | 27,868 | 51,807.83 |
| IX | 20,895 | 50,060.00 | 17,422 | 44,007.65 |
| X and XIV** | 12,708 | 31,358.00 | 12,808 | 31,484.02 |
| XI | n/a | n/a | 305 | 721.90 |
| XII | n/a | n/a | 394 | 594.11 |
| regional totals | 129,814 | 237,409.00 | 119,674 | 227,723.13 |
| national totals | | 26,502,363.00 | | 29,781,690.81 |
| 0-5 ha. holdings as % of national total | | 1% | | 1% |
| avg. ha. per holding | | 1.828839725 | | 1.902862192 |

* Regions I and XV are treated together, as Region XV was created in 2007 out of Region I.

** Regions X and XIV are treated together, as Region XIV was created in 2007 out of Region X.

*Source*: Chile INE, 1997 and 2007

## *Current Agricultural and Fruit Sector Development*

Where capitalist agriculture grows amidst global flows of production, exchange, investment, and technology, it has normally been "recorded alongside more fundamental restructuring of local economies and social relations" (Gwynne, 2002: 311). The water PRs system that increased investment in water-efficient irrigation technology to expand NTAE has been one factor that has augmented (Donoso and Melo, 2004; Saleth and Dinar, 2004). It has also been asserted that its "principal beneficiaries have been the growers of higher-valued crops, such as fruits, vegetables, vineyards, and sugar beets" (Hearne and Donoso, 2005: 65). This section seeks to outline how this has been the case for the Chilean agricultural development path with regards to the fruit sector. This is chosen because of its growth trajectory and its establishment as an important source of

exports. This provides an interesting study in regards to the efficiency of allocating water resources amongst competing landholders—SSFs and export-oriented producers—who put the water to different-valued uses.

In the 1960s and 1970s, the Central Valley was planted with vineyards and apple orchards for sector diversification. National fruit companies seeking the best prices and greatest potential to expand exports settled largely in Regions IV and III. Multinationals and conglomerates followed suite, accelerating land concentration and expansion intensely. The fruit sector experienced private capital investment by domestic and foreign agribusiness in the mid-1980s that targeted larger, capitalist farmers. This intervention was to correct market failures in information, infrastructure, distribution, credit, and risk-insurance to advance flows of private capital into dynamic export markets (Kurtz, 2001: 7-9). The peso devaluation after the 1973 coup, and its over-valuation during the 1979-82 period of the broader Latin American debt crisis, pushed the country out of crisis sooner than most countries, and back on the road to recovery in 1985-1990. Export volumes continued to rise in the 1980s and 1990s, despite lower international prices (Kurtz, 2001: 7; Spoor, 2000).

Today, Chile is a net exporter of agricultural products in high-value fruits, and value added products such as processed fruits, wine, and dairy. Imports are mainly of traditional crops like maize, corn, and rice—a long entrenched trend in food imports. The agro-food exports net surplus was 7.8 USD billion in 2007; agriculture contributes 4% to gross domestic product (GDP) (OECD, 2009: 64). The country is the world's largest grape exporter, and second in kiwi and avocado export; table grapes account for most of the land dedicated to fruit In total, fruit accounts for 8% of exports, and this via 500 national and transnational export firms—leading are Dole and Chiquita—supplying 1,300 importers in 70 countries (Gwynne, 2002: 312; OECD, 2007a: 10). The privatisation of state-run sectors in the 1980s opened up funding bottlenecks for investment in transportation infrastructure (roads, ports, airport, large irrigation), complementing private sector investment in farm-level irrigation systems and refrigeration facilities that catalysed the export sector (OECD, 2007a: 7).

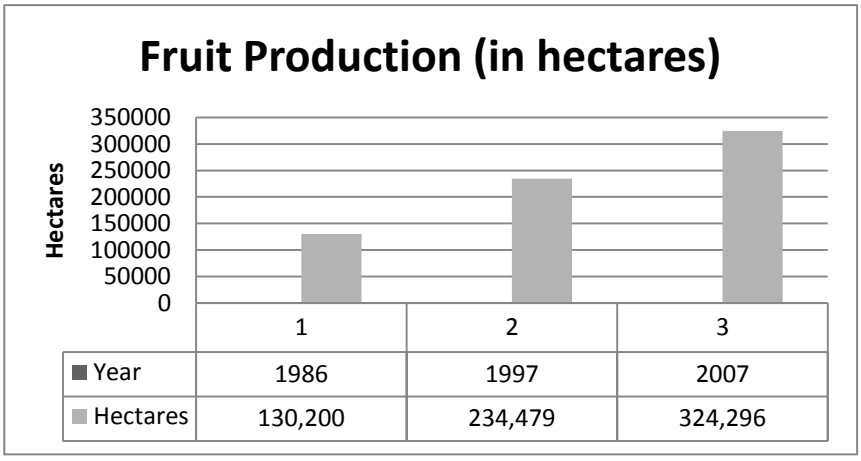
Fruit plantations are known to boost water consumption, as they require permanent, constant inter-seasonal irrigation. This consumption is moderated by the technical water efficiency of drip or other micro-irrigation method. Figure 2 portrays the sizeable jump in total hectares dedicated to fruit plantations of all species, specifically attention the nearly 150% increase from 1987 to 2007. Table 5 shows the national increase in irrigated land from 1997 to 2007 was 3.82%. The most striking is the disaggregated regional data which shows the increases were more dramatic amongst export-oriented productive regions. Especially noted are

the 53% increase in Region IV Coquimbo most of this in micro-irrigation technology. This trend was followed in Region I and Region XV together with 45%; then Region III with 38%; and Region V with 25%. It may be inferred from this data that the high-value of fruit production, its requirement for constant irrigation and increase in irrigated hectares, and the notable increases in holdings and hectares cultivated in the exporting regions II, III, and IV, that the growth is attributed to the fresh fruits and vegetables sector.

Land under vineyard cultivation (Figure 3) has increased by roughly 13,000 ha since the 1970s, more significant is the change seen from 1982, a year after the Water Code passed, with a 47% increase in vineyard hectares from 1982 to 2007. Coquimbo Region IV's vineyards have increased by 21% in the 1997 to 2007 period.

**Figure 2**

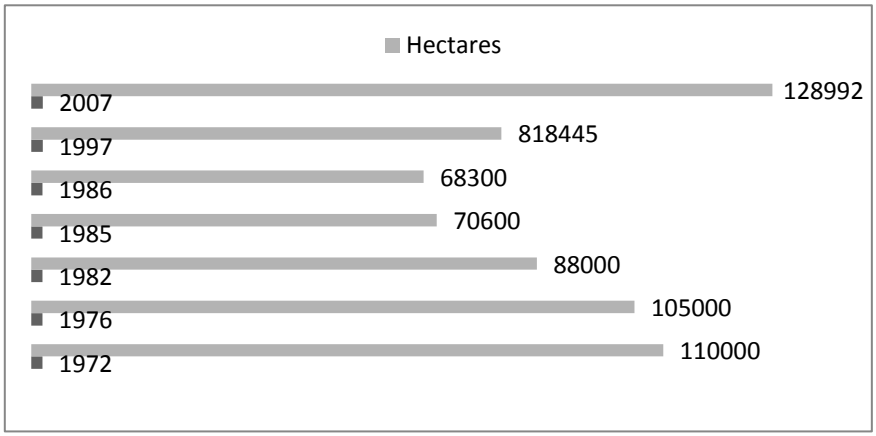
**Hectares under Fruit cultivation, per Census Year**




*Source*: Chile INE, 1997 and 2007; ODEPA and CIREN-CORFO in Gomez and Echenique, 1988.

**Figure 3**

**Hectares under vineyard cultivation from 1972-2007, compiled as national aggregate of regions**




*Source*: Chile INE, 1997 and 2007; ODEPA and CIREN-CORFO in Gomez and Echenique, 1988.

In the phase of early growth, TNCs jumpstarted production by contracting farms of various sizes and capacities. In time, farm size and the nature of production were the factors that differentiated impacts on farmers. Labour-intensive crops were contracted, while for land-intensive crops TNCs sought to own land or contract with selected largeholders (Gwynne, 2002: 315).

In the second, advanced phase, export producers consolidated. To minimise transaction costs and utilise markets, TNCs sought vertical integration or preferred contracts with only largeholders whose economies of scale keep fixed costs and credit-access steady (Gwynne, 2002). With growth, the entry and transaction costs, debt, and information asymmetries were debilitating for SSFs. Those who struggled under debt were bought out by TNCs; they were paid cash, could keep their houses and gardens, and if they did not migrate, they were incorporated into the agricultural (especially grape) labour force (Blandon et al, 2009; Gwynne, 2002: 317).

Fresh fruit exports have changed in monetary output from 168 million USD in 1980 to 1.911 billion USD in 2004, more than an eleven-fold increase. Likewise, physical output increased from 261,000 metric tonnes in 1980 to 2,157,000 in 2004 (OECD, 2007a: 11), both figures indicating tremendous growth. This production is dominated by mid-size farms. Constraints in human and physical capital limit SSF ability to meet quality standards required for entry into contract consignment price agreements and supermarket supply chain (SSC) contracts for high-value

produce (Gwynne, 2002; OECD, 2007b). Yet, despite lack of knowledge, technical capacity, and economies of scale SSFs can sometimes compensate with highly-tuned management skills in order to fulfil the private voluntary standards (PVS), especially in berry, avocado, nut, and grape production. Despite the odds against them in this high-value global value chain (GVC) and value-added sector (e.g. processed fruits), there are an estimated 3,000 peasant farmers of less than 7 ha that mainly produce berries and avocados for export (OECD, 2007a: 14).

**Table 5**

**Irrigated Land According to Irrigation Type, per Region**

| | 1997 | | | | 2007 | | | | 1997-2007 |
|---|---|---|---|---|---|---|---|---|---|
| | **Gravity Irr.** | **Mech. Irr.** | **Micro. Irr.** | **1997 TOTAL** | **Gravity Irr.** | **Mech. Irr.** | **Micro. Irr.** | **2007 TOTAL** | **total irrigation** |
| | Area (ha) | Area (ha) | Area (ha) | Area (ha) | Area (ha) | Area (ha) | Area (ha) | Area (ha) | % increase irrigation |
| **National Total** | 960,840.00 | 30,522.50 | 62,153.30 | 1,053,515.80 | 789,839.91 | 56,498.27 | 247,474.23 | 1,093,812.41 | 3.82 |
| I & XV: Tarapacá & Aríca and Parinacotá* | 6,904.40 | 7.8 | 1,560.10 | 8,472.30 | 9,789.91 | 54.14 | 2,457.00 | 12,301.05 | 45.19 |
| II: Antofagasta | 2,911.20 | 0 | 49.4 | 2,960.60 | 2,250.40 | 26.93 | 18.31 | 2,295.64 | -22.46 |
| III: Atacama | 6,777 | 66.1 | 7,342.50 | 14,185.50 | 7,414.34 | 69.50 | 12,061.09 | 19,544.93 | 37.78 |
| IV: Coquimbo | 34,962.50 | 445.6 | 14,051.10 | 49,459.20 | 38,431.51 | 1,170.95 | 36,106.16 | 75,708.62 | 53.07 |
| V: Valparaíso | 49,757.40 | 3,528.40 | 15,521.70 | 68,807.50 | 36,015.69 | 2,827.20 | 47,313.32 | 86,156.21 | 25.21 |
| VI: O'Higgins | 197,382.40 | 3,020.90 | 6572.7 | 206,976.00 | 151,791.43 | 2,787.44 | 56,112.14 | 210,691.01 | 1.79 |
| VII: Maule | 312,790.30 | 3,319.80 | 3716 | 319,826.10 | 255,854.58 | 5,575.33 | 37,629.89 | 299,059.80 | -6.49 |
| VIII: Bío-Bío | 177,274.00 | 2,296.70 | 682.1 | 180,252.80 | 142,942.31 | 16,979.80 | 6,533.10 | 166,455.21 | -7.65 |
| IX: La Araucanía | 43,950.80 | 6,215.40 | 557.7 | 50,723.90 | 33,226.73 | 12,233.10 | 4,311.62 | 49,771.45 | -1.88 |
| X & XIV: Los Lagos & Los Ríos** | 516 | 5,637.90 | 853.1 | 7,007.00 | 565.90 | 9,148.10 | 2,820.60 | 12,534.60 | 78.89 |
| XI: Aysen | 0 | 0 | 0 | 0.00 | 1,227.00 | 1,487.91 | 52.44 | 2,767.35 | 0.00 |
| XII: Magallanes y Antártica | 0 | 0 | 0 | 0.00 | 19,439.99 | 338.04 | 16.17 | 19,794.20 | 0.00 |
| Región Metropolitana de Santiago | 127,613.70 | 5983.9 | 11246.9 | 144,844.50 | 90,890.12 | 3,799.83 | 42,042.39 | 136,732.34 | -5.60 |

* Regions I and XV are treated together, as Region XV was created in 2007 out of Region I.

** Regions X and XIV are treated together, as Region XIV was created in 2007 out of Region X.

*Source*: Chile INE, 1997 and 2007

These production contracts that funnel produce into SSCs differ markedly from unregulated spot market sales at farm gate prices. SSFs drawn into supply chains depend on macroeconomic stability and pricing, as well as farmers' assets and resilience. SSF success depends on adaptation to contract variables. Chief among these, concerning water inputs, is how the frequency of delivery schedules pressures SSFs to have access to production and logistical assets (e.g. irrigation) that will allow them to produce continuously. Overall, the SSC contracts are demanding for SSFs, for whom transaction costs are proportionally more inhibitive for them than those who can control these costs and information. Market entry costs are associated, then, with the upfront investments in specific irrigation infrastructure and access to water as an input. (Blandon, Henson, and Islam, 2009: 258-259; OECD, 2007a).

In summary, it may be gathered from this chapter that interventions to correct market failures in information, infrastructure, distribution, credit, and risk-insurance were critical private capital flows that built dynamic NTAE production and value chains (Kurtz, 2002). The competition in these markets has proven extremely challenging for SSFs to enter due to rigorous PVS, technology, knowledge, and capital demands. We can argued that the fruit sector is a major sector to exhibit agrarian group differences by the likelihood of entering its knowledge and capital-intensive, high-value production that is integrated with international capital in the globalised food production and distribution network.

# Chapter 6 Water Market Engagement: Mechanisms that bring Assumptions into Practice

New Institutional Economics theorises that institutional control over transaction costs (including infrastructure transfer capabilities) enables or limits the effectiveness of water markets to efficiently allocate water to high-value use. The mechanisms working within the three spheres of transaction costs, infrastructure, and institutions affect different groups will raise or lower the chances for efficiency. On one hand, water users' bargaining power within spheres is partly what makes them efficient in water use and able to put water to highest-value use. On the other hand, the lack of bargaining strength is due to a number of market and non-market factors. In the following chapter, is argued that the neoliberal assumptions for the Water Code did not account for these factors and mechanisms that preclude small, low-value producers from the benefits of water markets, and the mechanisms that contribute to the differential engagement of different groups. The assumptions are presented here in the reverse order from Chapter 2. This is to build toward the more theoretical base.

## 6.1 Assumption: There will be Poverty Alleviation and Public Budget Savings

Scheleyer and Rosegrant compliment the water market system, boasting its greatest achievement to be in the social sphere—the redistribution of wealth and reduction of poverty (1996: 46). This was in part justified since the state no longer invested in or subsidised large hydraulic projects financed out of taxes; for regardless of who benefits from the hydraulic projects, all people contribute through taxation. Another offered advantage of water markets is that it empowers rights holders to decide when to give consent for a reallocation (Dinar, Rosegrant, Meinzen-Dick, 1997: 13). This is especially helpful for the pro-market discourse championing the security of tenure and option for sale on the market as advantages for poor or small farmers, especially for use as a form of drought insurance or sold for extra income. Rather than framing the sale of water rights as a possible end of productive activities for these farmers, this discourse supports markets because they provide the *option* to sell water rights in order to capture returns (Hadjigeorgalis, 2006; Hadjigeorgalis, 2009: 62).

This positive view of budget alleviation does not parallel the state's current financial undertaking for agricultural water works. The national agricultural budget increased from 83 USD million in 1995 to 418 USD million in 2007, 60% of

which goes to irrigation programs, productivity and skills development, and rural development. Small-scale agriculture is granted 45% for enhancing competitiveness, partly administered by the *Instituto de Desarollo Agropecuario* (INDAP), which promotes small agriculture development, and accounts for 30% of the sector budget (OECD, 2009: 67). In 2007, 22% of the budget (equating to 91 USD million) went to irrigation subsidies and spending for on- and off-farm components. Farmers either received subsidies to improve on-farm existing infrastructure (40% budget) as administered through the National Irrigation Commission (CNR) under the Ministry of Agriculture; or off-farm infrastructure support which received 60% of budget, administered through MOP. The CNR subsidises up to 75% for qualifying (i.e. registered rights holders) small-scale, private irrigation systems, focused mainly on vulnerable farmers (Hearne and Donoso, 2005: 60; Donoso and Melo, 2004: 14). One study showed INDAP formalised only 5% of applications for *campesino* water communities in a six year period (Galaz, 2004: 426). This slow pace impedes on the legal requirements that farmers need in order to access other livelihood amenities when they need them. What the CNR's target groups of 'vulnerable farmers' does not account for are those left out because they cannot overcome the transaction costs to acquire rights, to registers, and subsequently be under a WUA; *these* are the truly vulnerable, not accounted for by the government subsidies for lack of registration and other resources.

On the same note of access to resources, INDAP is also a small-scale agricultural creditor, but accounts for only 3% of the national portfolio, though over 59,000 farmers received credit from them in 2007. More critical than its role as a direct credit institution, INDAP facilitates small-scale agricultural credit through other lending institutions by compensating other lenders for the risk they undertake in dealing with SSFs (OECD, 2009: 69).

What is striking about this information is how the state is still heavily investing in financial support for farmers' water amenities. For the irrigation sector to receive so great a percentage of the national budget indicates that something is amiss, and that the expected full-cost recovery and private investment are not sufficient to sustain or advance the sector without state intervention. Without this state support, the infrastructure costs and challenges to acquiring capital/credit would prove too high, inhibiting their ability to buy and use water rights. Especially interesting is the financial and credit roles of MOP and INDAP to augment the productivity and viability of SSFs. Again, the necessity of state intervention infers that the highly competitive neoliberal environment for agricultural inputs and production is not benefitting SSFs enough to sustain them.

## 6.2 Assumption: There will be Cooperation, Social Respect, and Fair Dispute Settlement

Where unequal users dispute their use or non-use of water rights with each other, the conflicts often highlight the differential abilities of groups to wield power (Galaz, 2004: 425). In addition, the legally strengthened PRs system and absence of state regulation places trust in the social respect for the rights of others and that the legal nature of rights will provide equal access to a fair and impartial conflict resolving mechanism, especially in the absence of a top-down centralised system (Galaz, 2004). The establishment of state-protected private property rights gives all users equal legal protection. Security of rights should, theoretically, diminishes the costs of protection or conflict resolution over water rights violations from other users (Schleyer and Rosegrant, 1996).

The problem with assuming that legal protection will equate to social harmony disregards the unequal power used by different groups to follow their economic interests. Legal conflicts are relegated to civil courts or are settled within the WUAs. Past cases have shown the judicial system to be partial to socio-economic class, slow and inconsistent, especially with regards to enforcing court rulings (Galaz, 2004; Van Koppen, 2007). Though WUAs are the most important water conflict resolution institutions in Chile, they often lack legal and technical capacity to deal well with irrigation and water rights conflicts (Galaz, 2004: 425). The Water Code authorises the board of the user association to act as arbitrator. The decision about the conflict must be reached by a majority of the board, and may be further contested by the claimant in court (Donoso, 2006: 162).

The rarity of violations brought to the public eye by SSFs assumes that where there are violations, they are being dealt with in a just manner. Water users not organised under a WUA lack the coordination, administrative, and even political benefits of the structure; many simply do not raise complaints about violation. Still others do not trust WUAs to represent their interests. Furthermore, it has been shown that peasant farmers are least prioritised, and their needs are met last (Galaz, 2004: 426). In addition, the unknown number of historic rights (many attached to Agrarian Reform land) that are unregistered represents many of unorganised, informal water users who are not protected under the structure of a WUA that are weak when in legal battles (Galaz, 2004: 426).

There was one case in which the power to manipulate the system becomes clear, cited by Galaz (2004). A group of farmers had their water rights utility hampered by a real estate investor who developed his own land, adjacent to the farm land. After ten years of water diversion, the farmers took the case to court where the judge favoured the farmers. This did not end the water diversion, and the court proceedings were repeated in favour of the farmers, but there was no

legal action to follow-through in protecting their water rights. Of the 300 farmers, many sold their land and found alternate sources of income (Galaz, 2004: 419).

## 6.3 Assumption: The Market is an Equal Playing Field of Homogenous Water Users

The neoliberal assumption of equality is based on the individual ownership of property rights that grant each person the same legal endowment of resource claim.

Market-based perspectives that assume an equal playing field run the risk of conceptualising water users as homogenous, one-dimensional actors in a vacuum (Galaz, 2004; Hadjigeorgalis, 2009). This assumption draws all users—commercial, peasant, and indigenous—into the "liberal equality myth" which suggests that a modern water society can be engineered to provide efficient and equitable water provision through legislation (Boelens, 2009: 314) regardless of cultural, economic, or historic differences. Heterogeneity is based, for example, on respective land endowments, human capital, and opportunity costs of labour which lead to differences in the marginal productivity of water (McCarthy and Essam, 2009).

## 6.4 Assumption: Efficient Water Rights Transfers Will Not Incur Transaction Costs

All transfers have a cost. These are often linked to the physical infrastructure that facilitates water transfers and the institutions that encompass the administrative, legal, and socio-political aspects of water transfers. Ideally, transactions costs should be low enough to make the transaction profitable for all parties involved (Zegarra, 2002: 30). They include the following: inspections and hydrological studies by water agencies; improving or constructing physical infrastructure to measure and transport water; coordinating buyers and sellers; negotiating, legalising, and enforcing contracts; registration; user association permits; and decision-making costs (Donoso 2006; Hearne, 1996). Where transactions costs are too high, the group of active buyers and sellers will be limited, resulting in non-competitive pricing (Hearne and Easter, 1997: 188).

Transaction and decision-making costs can be debilitating for those without the economic means or knowledge to manage them; likewise, the cost of imperfect or asymmetric information affects different actors with respect to their economic and productive capacities to react. The costs' subsequent externalities and

inefficiency are considered by some to be the fallout from inadequately defined property rights or poor knowledge about water availability (Donoso, 2006: 163).

One case from field work in Chile by Jessica Budds explains the disparities between groups as a results of differential transaction costs, or more simply, the costs imposed by the legal and institutional framework of the market system that cause the differences in water use and water rights access: In semi-arid Norte Chico, in Petorca and La Ligua Valleys, where long established farmers cultivate crops on the valley floor, there are steep valley walls of rain-fed land that remained unused by the peasants who had been allocated it by CORA. In order to take advantage of the 1-2$^{o}$ C difference, fruit farmers buy this land to cultivate citrus, avocado, and nut trees. So, with the availability of the steep, untilled slopes and mechanised groundwater pump extraction and drip irrigation technology the fruit boom has accelerated and heightened the tension of ground and surface water resources (Budds, 2004: 331-333; Budds 2009b).

Because most surface water rights are fully allocated and flows are prone to drying up at certain times of the year, groundwater is the most vied after and inter-seasonally reliable source. Peasants, though slower in this movement, are also converting their original land parcels on the valley floor to avocado plantations. This is limited by a restriction prohibiting any new groundwater rights, starting in 1996, spurring farmers to adapt and deepen boreholes for irrigation, which is illegal, or formalise historic rights attached to the original CORA-redistributed land. Because the formalisation process proves so demanding—requiring technical field studies, local court decisions, and proof of original appropriation often spurring bribery and false witnesses—mostly large farmers have the resources to undertake it. The market activity here is low, as well, since there is virtually no one selling rights to meet demand, and when there are sales, they are high. Furthermore in terms of surface water, the up-slope large farmers in both valleys have the upstream advantage, vying to form JVAs that support further withdrawals of surface water. These large farmers have the resources to build infrastructure to exploit more water from river flows, they have submitted 90% of the applications for new groundwater rights and well as holding superior abilities to formalise historic rights attached to original *parcelero* land that they buy. It is because of the dominance of the large export-fruit farmers that peasants are often left with few choices but illegal means of water extraction. (Budds, 2004: 331-333; Budds 2009b).

## 6.5 Assumption: Privatised Information Gathering is Superior

As opposed to the top-down state approach of water distribution, where access to water does not depend much the government information or price for allocation,

water markets greatly depend on the information held by participants. Since information is decentralised, water institutions like WUAs are key informants of the laws and procedures for transaction. Because water markets are voluntary, prices are meant to offer a fair indication of opportunity costs and incentives to participants (Bruns and Meinzen-Dick, 2005; Meinzen-Dick, 2007). Price signals are adequate information upon which to base economic decision-making. While this is a logical and largely undisputed concept, it is problematic when coupled with the assumption that all parties in a transaction have equal knowledge of the market, price trends, and the forces behind given prices. Prices internalise water scarcity value; incentivise users toward effective and minimal waste use; and indicate possible gains from trade, this is despite where social equity would allocate to those who need the resource.

## 6.6 Assumption: There will be Many, Frequent Transactions

Spot markets, which are often informal, provide temporary sale of a portion of water from legal or prescriptive rights, but not sales of water rights. These exchanges are low risk, and require less information of the market and the buyer-seller relationship. Permanent exchanges of water rights, however, place greater import on information because of the permanent loss of the PRs bundle (Hearne, 1996: 188). In general, stagnant, thin water markets are attributed to the rigidity of water distribution; legal uncertainty due to unregistered rights; cultural and psychological attitudes; and opting for cheaper alternatives (Bjornlund and McKay, 2002). It may further be due to the optimality of original distribution, making further allocation both unnecessary and inefficient (Budds, 2009b: 45) or misguided economic signals of price and value (Bauer, 1997: 646). Most water rights transactions are between sectors rather than individuals, typically with transfers out of agriculture to productive sectors with more political economic clout, such as mining, hydropower, and urban uses (Bjornlund and McCay, 2002; Roth et al., 2005).

Concerning Chile, water markets are not institutionalised (Hearne and Donoso, 2005: 54), nor are they widespread, occurring mainly in water-scarce valleys where water values are high (Hearne, 2007). A number of scholars and professionals agree that water markets have been active where water is scarce and of high economic value, allowing economically efficient allocation, though spot market outstrip permanent rights markets. Another group claims the overall system to be something of market failure, the low efficiency of thin markets with too few active and willing buyers and sellers (Donoso, 2006: 162; Donoso and Melo, 2005). Where transactions do take place, these "relatively efficient" markets reallocate consumptive rights from lower- to higher-value production demands, namely,

from traditional to export-oriented agriculture, or from agriculture to urban water supply and mining (Solanes and Jouravlev, 2006: 341).

Inter-sectoral water rights transfers in Chile are due to urban areas encroaching onto rural spaces, or where an expanding mining industry (especially in the north) has bought rights from farmers (Bauer, 1997: 646). A significant area for better cooperation and coordination of water uses is between the (non-consumptive) hydroelectric and (consumptive) irrigation sectors.

Examples of the frequency of intra-sectoral transfer are Bío Bío Region VIII and Los Andes Region V. These two areas showcase the difference in water market activity—as seen in water rights transfers—according to the regions' respective levels of agricultural intensity (traditional vs. capitalised) and crop mix (traditional crops vs. fruit exports). In Bío Bío in 1980-1991 there were 150 intra-regional sales of water rights that were each enough to irrigate about 8-10 ha, recorded by the Los Angeles Real Estate Title Office. These were 20% of water sold, as other water accompanied land. In contrast, in Los Andes Region, where post-Agrarian Reform land consolidation was accompanied with investment in irrigation technology and where table grape cultivation has grown steadily since the 1960s, there were 275 separates intra-regional sales of water rights in the same eleven year period. This is attributed Los Andes' capitalised fruit cultivation intensity and the higher value of water there (Bauer, 1997: 645).

## 6.7 Assumption: Markets are the Best Managers of a Natural Resource

To this point, this paper has been replete with notations of the neoliberal discourse that because users must account for costs incurred in using a resource, and the opportunity costs of its alternative uses, this gives incentive to invest in, maintain, and manage well the water resources that one holds property rights to, resulting in conservation (Dinar, Rosegrant, and Meinzen-Dick, 1997). Essentially, this is saying that positive or negative economic incentives will move actors to behave in such a way that nature is conserved. In addition, as in some cases in Australia, water markets are put in place to correct environmental externalities (Meinzen-Dick, 2007).

This does not take into account, however, that market transactions do sometimes result in externalities that are not borne by actors' transaction costs, but borne by the environment itself. While social equity standards call for compensation for the way these externalities negatively affect actors, it is ultimately the environment that may possibly suffer more irreversible damage from waterlogging, overdraft, pollution, change in return flows, and affects to downstream users (Dinar et al., 1997: 14). One way of understanding this market

approach to natural resource management is to consider it an extreme decentralisation to river basin associations or WUAs, and more so, a privatised type of management placing individual rights holders and water users as the keys actors to building an ecological water governance. This is in juxtaposition with NIE where individuals are competitors for the scarce resource, each holding various degrees of bargaining strength; and the goal of efficient allocation, which will place the scarce resource at the highest-value, minimal waste use. Neither efficiency nor competitive bargaining powers speak to the need for water user accountability in putting the resource to ecologically or environmentally conscientious and safe uses. It rather incentivises viewing water and water rights solely as an investment in a productive input that will bring a return to capital through productive means; and it passes over social equity that calls for just distribution of natural resources as public goods which all people should be vested with the opportunity to gain a livelihood from.

As mentioned in Chapter 3, the absence of the rule of beneficial and effective use (Dourojeanni and Jouravlev, 1999) relieves water users of accountability in water use. Also, until the 2005 Amendment, minimal environmental flows were not established for the decision-making to issue further water rights. While these last two points have more to do with insufficient institutional oversight, this provides a caveat: where markets determine allocation, strong institutions must ensure environmental protection and provide checks for environmental externalities wrought by the market.

As a last point, the neoliberalism of nature is not new, as witnessed by the Dublin Principles, the growth of global food production and distribution networks, and perhaps most fundamentally, a long history of global North-South imbalances that were "corrected" by neoliberal adjustment programs with detrimental environmental backlash.

## 6.8 Assumption: *Efficiency* is the Best Allocation.

Why? Why *is* efficiency the best allocation? It seems that somehow, the rationale behind this may be found in its own definition: economic efficiency is the *optimal* use of a resource, by moving it from *less to more efficient use* or by *increasing the resource's productivity* (Ellis, 1992: 19) for the *aggregate benefit of society* (Ellis, 1992; Dinar et al., 1997). For economy-wide advancement, resources must be allocated where they will bring the greatest return to capital. The example offered in Chapter 4 is that of the high-value Chilean fruit sector, which, through advanced technology, capital-, knowledge-, and labour-intense investments, is able to use water effectively to produce fruit for international export where it fetches prices higher than for domestic consumption. The economic advancement of those in

the fruit GVCs are considered an aggregate advancement because of it contribution to GDP growth. This is irrespective of the localised and specific nature of benefits in the industry. Efficiency leads to highest returns, investment in technical efficiency, and greatest gains at minimal losses, and is thus considered the development superlative. This is the oft-repeated goal in economics. Two studies from 1975-1992 showed a 22% and a 26% increase in aggregate irrigation water use efficiency. At the time, the increased water use efficiency of the 1.2 million ha under irrigation allowed for an additional 264,000 ha to be irrigated (Scheleyer and Rosegrant, 1996: 44).

Before placing efficiency on a virtuous pedestal, social equity must be considered. Here, we come full circle from Chapter 2. Social equity, to remind ourselves, is concerned with the *distribution* of economic *benefits* and *equal access* to water resources for all members of society *irrespective* of *economic standing,* and according to local culture-based concepts of *fairness* (Cai, 2008; Cremers et al., 2005; Saleth and Dinar, 2004). The contrast, then, is that a socially equitable allocation provides resources for equal opportunities to gain benefits or returns to capital, rather than allocating to the strongest contender. Unfortunately, few studies provide information about the social equity of water markets, except to attribute a general increase in social welfare in correlation to overall liberalisation of the economy, which is well known to also contribute to social and economic marginalisation of social groups involved in low-value production. The previously (Chapter 4) cited contribution of the liberalisation in Chilean agriculture is its employment in the rural population and especially women.

Based on the information presented in this chapter, one may suggest several conclusions about each assumption: First, poverty alleviation and alleviation of the water burden on taxpayers have not materialised because of water markets, per se, but general economic development. The increasing state budget, much of which subsidises irrigation indicates the sector still require significant state assistance in order to continue growing. The subvention for small-scale agriculture suggests that the decentralised approach to water management is neither self-sustaining, nor sustainable in the long-term if it requires state subsidies for small famers to survive. Second, social and economic power does influence the security of rights tenure because the security provided by the state does not always trickle down through the judicial and WUA violation settlement processes to equate to *action* to protect. Third, water users are heterogeneous according to their resources, knowledge, endowments, culture, and abilities to access and use water rights. Fourth, that the transaction costs and information sourcing pose debilitating challenges to water rights formalisation and registration, rational choices for optimal buying/selling prices, and access to dispute resolution. Fifth, decentralised informa-

tion gathering by WUAs and individuals places may sometimes place the responsibility on marginalised groups without the capacity to find, use, or interpret the information in such a way as to translate into empowerment through rights-holding or transaction. Sixth, transactions are not frequent and markets are not active at a national level, reducing the positive predictions the benefits of active water markets. The benefits that do exist, however, are beneficial for those with bargaining strength in the system. Seventh, the market as the best manager of a natural resource is somewhat paradoxical due to market goals for efficiency that render water resource to be commoditised and natural resources are public goods to be distributed for socially equitable access and allocation. Where efficiency is the goal, economic incentives are prioritised over environmental or ecological principles, except for where exploitation may limit economic productivity. And last, if social equity is measured by a locally and culturally held view of fairness, then anywhere efficiency is the underlying goal and guide for water distribution the two will be in conflict and there will be some people left out.

The following chapter provides two concrete cases that together give a better view of some of the specific ways in which water markets are functioning in Chile, who participates, and how.

# Chapter 7 Analysis of samples cases in Coquimbo Region IV

## 7.1 Brief Introduction to Agrarian Classes in Coquimbo Region

The following cases are in the Limarí Valleys in Coquimbo Region IV the agricultural zone with the most active water market. While these studies provide starting points to project possible trends, in generalising the Limarí-specific conclusions from the survey data one must be cognisant of regional variations in geography, water scarcity, irrigation technology, water rights, system management, cropping system, and information.

Table 6 indicates the 1997-2007 percentage increase of largeholders and their land area for all three basins in Coquimbo, the fall in holdings and hectares of mid-sized producers, and a steady landholding among a rising number of smallholders. More specifically, Figure 4 portrays the significant portion of Coquimbo's productive groups and land in Limarí Valley, as well as a nearly inverse relation between number of landholders and the hectares of land held. This disparate landholding size is the first indicator that members are not homogenous in their endowments or economic capabilities to acquire water rights and to exercise the rights bundles.

The use of the term "peasant" by Romano and Leporati's definition indicates a farm of no more than 12 ha, which departs from the previous use in this paper which describes SSFs and peasants as holding less than 5 ha. The 'capitalist' category given by Romano and Leporati then indicates any with holdings over 12 ha, which were previously the mediumholders (5-100 ha) and largeholders (>100 ha). For the sake of simplicity, this chapter will use the terms 'peasant' and 'capitalist'.

**Table 6**

**Land holdings and hectares per year for the Region IV Coquimbo**

| Coquimbo | Smallholders | | Mediumholders | | Largeholders | | **Total** | |
|---|---|---|---|---|---|---|---|---|
| | holdings | ha | holdings | ha | holdings | ha | holdings | ha |
| 1997 | 10,948.00 | 16,770.20 | 5,607.00 | 120,604.00 | 754.00 | 3,766,079.00 | 17,309.00 | 3,903,453.20 |
| 2007 | 9,407.00 | 15,942.15 | 2,784.00 | 81,360.00 | 930.00 | 3,893,046.00 | 13,121.00 | 3,990,348.15 |

*Source*: Chile INE, 1997 and 2007

## 7.2 Cases in the Limarí Valley

Zegarra conducted his field survey in 1998, as did Romano and Leporati; all did so in the Limarí Valley. The work by Eduardo Zegarra focuses on the water rental ('spot') markets, while Romano and Leporati provide a moredistinct study on the distribution of rights within the valley, and the changes over time (1981-1997). The reason these studies are being relayed together is because they offer different perspectives on the same Valley. Romano and Leporati, as mentioned, provide a wider scope of 16 years, while Zegarra looks at the specific dynamics that catalysed market activity during the three year drought.

In late 1997, the market nearly collapsed with prices escalated to 15 times their previous scarcity maximum in 1994. Consequently, Zegarra's study was carried out in the context of a negative shock to the market and shows possible outliers to market activity norms. Limiting this research is the lack of data on farmers who sold them their rights as they were no longer represented in the "supply" for the rights market.

The Limarí Valley has 40,000 Ha of land under agricultural cultivation for which water is regulated; the lower part of the valley is fed by the Cogotí and Recoleta Dams and the Paloma Reservoir (Zegarra, 2002: 32). High value permanent crops increased from 16% to 44% from 1987 to 1997, which is arguably attributed to the higher regulation of water resources that made investment in permanent crops and irrigation infrastructure more secure (Zegarra, 2002: 49). In terms of water use per hectare, the most demanding activity is horticulture, followed by pisco grape and avocado production (referred to as pisco-avocado from here); export grapes take up very low levels of water explainable by efficient drip irrigation. The high use of machinery in pisco-avocado production and export grape production show that these are highly capital-intensive activities. So, if those with the capital to invest are the ones in the export grape and pisco-avocado production, they are often the ones best able to invest in drip irrigation or other improved irrigation infrastructure for the sake of efficiency.

### *Registrations in Limarí Valley*

The number of registrations in the Limarí Valley from 1981 to 1997 shows the differences in registration behaviour between peasant and capitalist groups. The initial number of registrations by peasants (51.69% of total registrations) in 1981 was followed by a subsequent average of 8.93 registrations per year. The average for capitalists—not including the years 1981, 1988, or 1993 because of distortion

effects[6]—was 17.36, almost twice that of the peasants; meanwhile the non-agricultural sector registration average was 13.00. What is notable about the registration data is the immediate dive downward in 1982 of peasant rights registration, a fall from 51.69% to 1.29%, a fall larger than for the other two groups studied (Romano and Leporati, 2002: 5).

Why this is notable is the disparity between the 1981 figures and those that follow may indicate the anomalies of first year and the 'distortion years' compared to what became systemic inequality in rights acquisitions and registrations due to groups' power differentials. The decline in peasant registrations may be attributable to a low number of new rights for peasants, a low number of peasants, difficulties in registration, or very slow markets. Looking again at Table 6 shows that smallholders/peasants are consistently a minimum of twice the population of the medium and largeholders together, though only a small percentage of total agricultural land. If registrations are any indication of the differential abilities among groups, this would indicate the peasants face the greatest challenges in registering, and possibly even acquiring new rights. This lack of registration spurs informal water transfers and water sharing among

### *Water Rights Distribution*

Registrations directly to Table 7 which indicates the distribution per person (per capita) of water rights among the peasantry of Limarí Valley from 1981 to 1997. It shows a trend of significant per capita losses among the poorest three quintiles (Q), ranging from 36-53% losses. For quintile 1 (Q1) and Q2, the relative losses in these quintiles is significant, as well as the very low absolute numbers. Such a significant change in control over productive inputs may, again, be attributed to the bargaining power of these groups that allows them to control their transaction costs, utilise infrastructure, and engage with water institutions. To refer again to Table 6, the majority of the agricultural population is in this peasant class and, to refer back to Table 1, the peasantry holds the smallest average land plots; and in

[6] 1981 is excluded for its unique place as the first year of the water reform. The years 1988 and 1993 are excluded on grounds of the "political cycle effect" where Pinochet's administration used rights assignation as a means to secure favour or votes in the plebiscite and presidential election, respectively (Romano and Leporati, 2002: 5).

Table 4 the groups shows it is falling in both land area in numbers. Can this be attributed to a loss in water rights? It may be argued that in the semi-arid parts of the country where high-value NTAE production will inevitably be the most efficient choice to raise the aggregate social benefits, that water use in small-scale farming is an aggregate economic loss. However, from a social equity perspective, the sale of rights in a competitive, liberalised agricultural economy can marginalise these peasants, reducing their productivity, or actually offering escape from agricultural livelihoods through wage labour or other income.

**Table 7**

**Per capita (P.c) water shares among peasants, in number of water shares**

| Quintiles | 1981 | | 1987 | | 1992 | | 1997 | | 1981-1997 |
|---|---|---|---|---|---|---|---|---|---|
| | P.c. Shares | % in total | P.c. Shares | % in total | P.c. Shares | % in total | P.c. Shares | % in total | % change |
| 1 | 0.81 | 1.38 | 0.76 | 1.36 | 0.55 | 1.08 | 0.52 | 1.06 | -35.80 |
| 2 | 2.7 | 4.58 | 2.25 | 4.03 | 1.4 | 2.75 | 1.26 | 2.57 | -53.33 |
| 3 | 8.34 | 14.19 | 7.15 | 12.82 | 4.93 | 9.69 | 4.32 | 8.84 | -48.20 |
| 4 | 15.5 | 26.36 | 15.7 | 28.16 | 13.76 | 27.04 | 12.88 | 26.34 | -16.90 |
| 5 | 31.46 | 53.5 | 29.88 | 53.62 | 30.26 | 59.44 | 29.92 | 61.18 | -4.90 |
| **Total** | 58.81 | 100 | 55.74 | 100 | 10.18 | 100 | 9.78 | 100 | -83.37 |

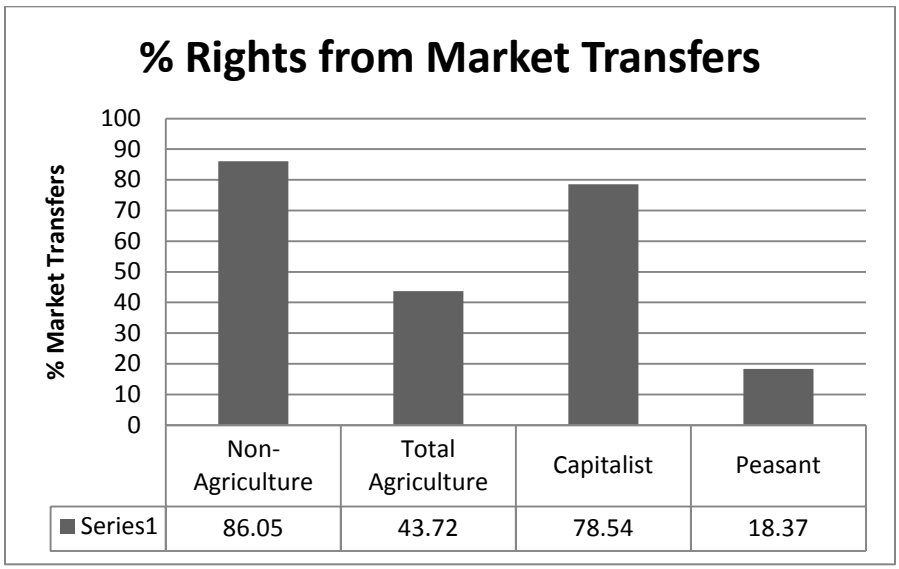
*Source*: Romano and Leporati, 2002

### *Right Acquired Through Market Transaction*

The percentage of water rights that each group has acquired from the market in 1981-1997 is depicted in Figure 5. Peasants hold 81.63% of their original rights, leaving only 18.37% acquired from market transactions. The data for capitalist farmers' rights was a near reversal of these statistics, with 78.54% of rights from market transactions, while the non-agricultural sectors shows the highest percentage of rights bought on the market. The most active participants are, arguably, the most high-value as well. As discussed in Chapter 4, large-scale farmers that produce for export and are often contracted with fruit companies have greater access to credit, capital, knowledge, and technology to keep their production steady, high yielding, and with as few risks of irrigation obstructions as possible. The peasantry engages in the market very little, except to sell rights. Essentially, selling water rights in times of drought or other may end already tenuous agricultural production processes in favour of a (possibly) steadier wage labour employment. Essentially, the vulnerability of such groups to sell assets or for factors of production to run dry furthers the de-peasantisation processes into landless wage labour.

**Figure 4**

**Percentage of Rights Acquired Through Market Transactions, Held Per Sector (1981-1997)**




*Source*: Romano and Leporati, 2002

Data acquired by Zegarra in Table 10 shows the pisco-avocado sector in Limarí Valley to be the most active in buyers and sellers at the end of the drought when the survey was carried out. These were followed by export grape and horticulture sectors. The most purchases were by export-grape farmers able to afford high priced water through production contract provisions or credit access. This study shows is interesting to compare with that in Table 9 showing that the Traditional growers (most closely translates into peasant groups) sold none of their rights in the study year, but continued to acquire new rights through the market, behaviour almost parallel to the export grape sector. It is possible that when faced with survival, this group refuses to sell their rights—though they would fetch a high price—and instead buys what is available to compensate for water lost in poor irrigation technology or water inefficient growing methods.

To interpret Figure 4 and Table 9 from an NIE perspective, the competition between these groups, be they the traditional and horticulture peasants or the pisco-avocado and export grape capitalists—and the non-agricultural "third" sector—will show itself in the way the groups are able to lower transaction costs. This, as mentioned previously, is through lowering technical inefficiencies, working within water institutions to gain advantages through collective information gathering and infrastructure maintenance (WUAs), and strong cultivation techniques. Lowering the likelihood of transaction costs, then, and with

a differential entry into the market, ability to influence the market, access to international capital, and with non-market institutional intervention (such as state irrigation subsidies for registered water rights holders), this capitalist group—despite information and rationality imperfections—can use their bargaining strength and socio-economic power to turn water markets to their advantage. This is, in fact, what can be seen from the example by cite in Chapter 5 by Jessica Budds in the Pertoca and La Ligua Valleys. What is, unfortunately, disregarded in the neoliberal assumptions for water markets, but so clearly seen in the different market activity by different groups in Table 9 and 10, is that power relations are inevitable in a competitive market among heterogeneous participants. What is manifested in water markets today are reproductions of the institutionalised inequalities from before the Agrarian Reform. The unequal relations of production and relations of land tenure can be seen to parallel what can happen in the water sector when a commoditised resource becomes available amongst groups with differential buying power, and differential abilities to put that resource to efficient, profitable use.

**Table 8**

**Water Market Participation in Supply and Demand by Grower Type in 1997**

| | Traditional | | Horticulture | | Pisco Grapes | | Export Grapes | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | seller | buyer | seller | buyer | seller | buyer | seller | buyer | seller | buyer |
| Total | 0% | 21% | 11% | 23% | 11% | 35% | 4% | 24% | 9% | 28% |

*Source*: Zegarra, 2002

## *Water Transfers between Sectors*

The transfer between and within sectors of water rights, showing differential roles: the non-agricultural actors as buyers from peasants; peasants as sellers to capitalists; non-agriculture buying from both equally; and capitalist agriculturalists as moderate, manoeuvrable buyers and sellers mainly amongst themselves. The behaviour of the peasant class aligns with previous literature about using the rights as assets and livelihood security, as well as that the class holds a small number of rights, appropriate to the small land holdings and small total land held by them. They are more likely to broker deals amongst themselves based on personal networks and relationships of smallholders.

**Table 9**

**Intra-sector and inter-sector water rights transfers (as % of total), 1981-1997**

| Sales | Purchases | | | | |
|---|---|---|---|---|---|
| | Total | Non-Agriculture Sectors | Agriculture Total | Capitalist Agriculture | Peasant Agriculture |
| Capitalist Agriculture | 32.73 | 1.24 | 31.48 | 27.32 | 4.16 |
| Peasant Agriculture | 62.82 | 25.93 | 36.89 | 25.52 | 11.37 |
| Total Agriculture | 96.56 | 27.18 | 68.27 | 52.84 | 15.53 |
| Non-Agricultural Sector | 4.43 | 1.38 | 3.05 | 1.8 | 1.24 |
| Total | 100 | 28.57 | 71.42 | 54.64 | 16.78 |

*Source*: Romano and Leporati, 2002

From an NIE perspective, the significance of the competition between these groups (demonstrated in Figure 4 and Tables 9-10), be they the traditional and horticulture peasants or the pisco-avocado and export grape capitalists—and the non-agricultural "third" sector—will show itself in the way the groups are able to lower transaction costs. This, as mentioned previously, is through lowering technical inefficiencies, working within water institutions to gain advantages through collective information gathering and infrastructure maintenance (WUAs), and strong cultivation techniques. Lowering the likelihood of transaction costs, then, and with a differential entry into the market, ability to influence the market, access to international capital, and with non-market institutional intervention (such as state irrigation subsidies for registered water rights holders), this capitalist group—despite information and rationality imperfections—can use their bargaining strength and socio-economic power to turn water markets to their advantage. This is, in fact, what can be seen from the example by cite in Chapter 5 by Jessica Budds in the Pertoca and La Ligua Valleys. What is, unfortunately, disregarded in the neoliberal assumptions for water markets, but so clearly seen in the different market activity by different groups in Table 9 and 10, is that power relations are inevitable in a competitive market among heterogeneous participants. What is manifested in water markets today are reproductions of the institutionalised inequalities from before the Agrarian Reform. The unequal relations of production and relations of land tenure can be seen to parallel what can happen in the water sector when a commoditised resource becomes available amongst groups with differential buying power, and differential abilities to put that resource to efficient, profitable use.

The assumptions of neoliberal water policy places all actual and potential water users under a homogenising umbrella in which they are meant to be equal participants in the market, as well as the assumption that water markets would

produce poverty-alleviating social benefits may be dispelled with the data from Table 10. Limarí Valley peasant poverty in the lowest two quintiles rose by nearly 30% for each on. While this correlation is possibly a weak one, this data shows at least the vulnerability of this group and sensitivity to livelihoods inputs and the economic environment.

**Table 10**

**Poverty Among Peasants in the Limari Valley (in percentage), 1981-1997**

T

| Quintiles | 1981 | | 1987 | | 1992 | | 1997 | |
|---|---|---|---|---|---|---|---|---|
| | Poor | Non-Poor | Poor | Non-Poor | Poor | Non-Poor | Poor | Non-Poor |
| 1 | 38.1 | 61.9 | 40.37 | 59.63 | 54.86 | 45.14 | 66.48 | 33.52 |
| 2 | 0 | 100 | 10 | 90 | 25 | 75 | 29.36 | 70.64 |
| 3 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 |
| 4 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 |
| 5 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 |
| **Total** | 10.22 | 89.78 | 13.33 | 86.67 | 20.26 | 79.74 | 25.21 | 74.79 |

*Source:* Romano and Leporati, 2002

## *Responses to Water Shortage*

Since the surveys took place during and after an extreme drought, it is interesting to observe in Table 11 the differential responses of producer groups to the water shortage in 1994-1997. The average hectares held by crop producer group fell significantly (-60%) for livestock and (26%) for horticulture farmers, while it grew 2% for both pisco-avocado and export grape groups. It was not profitable for the latter two groups to reduce their land cultivation during the drought, choosing rather to sacrifice short-term profits to prevent long-run losses from water shortages (Zegarra, 2002: 67). This is explained by the rationality of preserving the sunk costs in crop technology and land that would motivate producers to continue to buy water rights at highly elevated prices in order to preserve the minimum required water for their plantations. These farmers were faced with paying high water prices to maintain their crops, or losing their crops altogether, those who have the most invested in an established crop system with rigid water input requirements, as well as the ability to pay, will do so. Those without such rigidity in water input requirements may be expected to 'weather' the storms of high pricing by altering land or water use practice, whereas those with neither the capital nor the prices to compensate for their loss in production, may in fact take the opportunity to sell their water rights or transfer water to provide an income

possibly greater than cultivating their small landholdings.

**Table 11**

**Strategies to Cope with Water Shortage, by Producer Type, Change in Hectares**

| Producers | Avg. ha. 1996 | Avg. ha. 1997 | % Δ 96/97 |
|---|---|---|---|
| Livestock | 11.9 | 4.9 | -60% |
| Horticulture | 9.7 | 7.2 | -26% |
| Artichoke/pepino | 12.2 | 7.2 | -41% |
| Pisco grapes/avocado | 12.8 | 13 | 2% |
| Export grapes | 33.5 | 34.2 | 2% |

*Source*: Zegarra, 2002

In conclusion, these cases in the Limarí Valley show the differential market activity and reactions of different groups. The conclusions are that peasants engaged in traditional crop and livestock growing are more prone to sell rights than to buy. In addition the group has experienced a decline in rights registration; their adaptations to water limit production while larger farmers hardly alter their land use; and there is an observed trend of low and further declining numbers of rights per person among the peasantry. It may be inferred from these observations that if trends continue, the vulnerability of this group will increase with water markets.

# Chapter 8 Conclusions

Because the foundational assumption and goal of the Water Code was that markets would efficiently place water to highest-value use, it cannot be judged for attaining what it set out to attain. Rather, the critique must be directed toward the processes by which efficiency has come to fruition, and the implication of this for social equity among different groups.

The neoliberal assumptions for the water reform are able to build a nice picture of the markets as an equal playing field, where participants act as equals, where redistribution solves poverty, and efficiency brings aggregate social benefits. New Institutional Economics is a useful tool to break this myth of equal marketplaces. Economic transactions are choices amidst socio-economic constrained actors with limited rationality and imperfect knowledge. Institutions are meant to moderate, to lower transaction costs as a consequence of production and information imperfection.

The first objective of this research was to understand how the neoliberal assumptions for water markets affect different agrarian groups. It is concluded that these overlooked the unequal opportunities of groups to engage in high-value production, namely, the advantages of economies of scale, land endowments, financial resources, and socio-economic power relations influencing the ability to acquire water rights and put them to highest-value use. The discovery is that the assumptions themselves are theoretically sound, within a neoliberal frame of thinking; unfortunately, in practice they are not sound, because power relations and contextual social factors permeate the way participants engage in markets.

The second objective of the research was to understand what mechanisms may be responsible for the differences in the neoliberal assumptions in practice. Some of mechanisms that may be drawn out have been explicitly cited in the previous chapters, while others have been implicit. The foundational reason for differential impacts is the starting point of inequality between groups, based on histories of land and water tenure under previous legal arrangements, financial endowments, geographic location (in valley), access to credit and institutions, and farms' productivity and flexibility as framed within the dynamic macroeconomic environment. Furthermore, mechanisms where neoliberal assumptions prove different in practice are: ability to control transaction costs, externalities, attaining market information, limitations in knowledge, and very key, registration costs and externalities from being unregistered.

With this in mind, this research reveals the critical importance of water rights registration. Without registration, there are almost no benefits from the market

system, especially as these rights cannot be sold, bought, or mortgaged on formal markets. Likewise, registration is required for formal membership in WUAs which provide the organisational coordination of labour and capital contributions from registered water users for constructing, maintaining, and managing irrigation infrastructure. Even state subsidies require recipients to be registered. Any amendments to this system would be highly recommended to ease the process of registering new or traditional rights as a starting point toward equitable engagement in water markets and organisations.

In addition, the fruit sector clearly exhibits agrarian group differences and the role of water security, among other factors, that continue to define these differences. The purported benefits of the water reform did not rectify agrarian inequalities, but worked within the differences for national growth interests. It is concluded here that the state's incentive to reform the water sector toward a property right market was for large, technologically advanced producers to take advantage of entering the fruit market by increasing water supply for irrigated fruit plantations, contributing to aggregate wealth through agricultural GDP.

Finally, it is concluded that neoliberal-guided allocation through water markets potentially initiate and drive trends in low and decreasing peasant water rights-holdings especially among the poorest and per capita rights distribution among peasants. Trends are also observed and projected for minimal water market activity by peasants, except to sell rights, and a falling rate of rights registrations. With a future of increased water scarcity, the continued implementation of water markets in Chile and elsewhere may be observed to widen the economic gap between agrarian groups in already unequal agricultural sectors, or in a liberalised agricultural economy with little centralised authority intervention.

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## Annex 1: *Agrarian Reform—Expanded Version*

The goal of the land redistribution in Chile's state-led agrarian reform (SLAR) was to channel the labour power of the landless peasants into agricultural productivity by redistributing to them the unused, unproductive lands belonging to *haciendas* and *latifundias*—the estates that the 1967 Agrarian Reform Law 16.040 defined as those holding more than 80 basic irrigated hectares (BIH)—and owned by *hacendados*. The reform concluded with 20% of total agricultural households benefitting from redistributed land (Lahiff, Borass Jr, and Kay, 2008). The 1955 census showed that the 10,000 largest holdings comprised 78% of the agricultural land, in short, the *hacienda* system held 80% of the land (Bellisario, 2006: 171; Gomez and Echenique, 1988: 91-92). Agriculture was based on a system in which *hacienda* workers held no legal right to land. Service tenants (*inquilinos, peones,* or sharecroppers) and salaried workers on the land were permanent labour for the *haciendas* and received small parcels of land which they paid for by their (indentured) labour (ibid). The third class was that of the rural proletariat, peasant farm families, and the owners of *minifundias* (small parcels of land <10 ha.) (Bellisario, 2007b: 168). The 1955 census figures show that the landed class as 3% of the population held 78% of the irrigated farm land. *Hacienda* workers were 40% of the workforce, but only 42% held land of their own, likewise, subsistence peasants comprised 26% of the labour force but held a mere 2% of the land (Bellisario, 2006: 179).

Aside from extreme concentration of land by *hacendados*, there were also a profuse number of divisions of land comprising the small *minifundias,* plots under 10 ha (e.g. 156,000 holdings accounting for only 1.4% of total arable land). From long before the Agrarian Reform, back in the 1930s, there had been weak coalition attempts to challenge landowners' power through land. The interests of wageworkers and industrial bourgeoisie, along with landowners, were best preserved by keeping rural populations out of politics and unable to influence political matters. Some consider that the landed class was simultaneously involved executively in corporations, making "hegemonic fractions" able to protect agricultural and industrial sectors during the ISI phase ending in 1973. This landowning class was also present in the judiciary, executive, administration, and congress. The social structure, then, was based on an oligarchic, rural landed class that extended its arm into key positions in the urban sphere, which empowered both of their positions (Bellisario, 2006: 195-196).

**Agrarian Producer Classifications, Census 1955**

| | |
|---|---|
| Group sub-family | 2 active persons, holding less than 5 ha. |
| Group family | 2-4 persons, holding between 5-1,999.9 ha. |
| Multi-family medium | 4-12 persons, holding between 20-4,999.9 ha. |
| Multi-family large | More than 12, holding between 100-5,000 ha. |

(Source: Chile National Institute of Statistics 1955)

In 1961 President Jorge Alessandri signed the Agrarian Reform Law 15.020, which was partly pushed by the possibility of losing aid from the Cuban Revolution-worried USA. In 1964 Christian Democrat President Eduardo Frei used this law as the basis for beginning land expropriations. The 1967 Agrarian Law 16.640 gave a definitive framework for the sequence and mechanism of the agrarian restructuring. Frei's administration acknowledged that the water and land rights systems were the major setbacks to economic, social, and political development (Bellisario, 2007a: 8-9). The Agrarian Reform expropriated all the estates over 80 BIH based on socio-economic surveys of land productivity, though some circumvented expropriation by dividing estates among family members, retaining it all as one productive unit (Bellisario, 2007a: 147). Frei's aproach was to instil capitalist modernisation by expropriating large inefficient estates, setting up agricultural cooperatives (*asentamientos*) and giving ex-tenants ownership rights, and state credit for agricultural production. His pledge for land reform was backed by the US anti-communist Alliance for Progress which hoped to avert a revolution in the countryside (Murray, 2005: 194). Under Frei, 10% of the *fundos* were expropriated, the rest were given incentives to modernise, and the *asentimientos'* irrigation availability increased (Solbrig, 2008: 500). By the end of the administration, 5,000 families had received land parcels, leaving the reform quite incomplete (Bellisario, 2007: 11).

The 1970-1973 Popular Unity government of President Salvador Allende sought to construct socialism and to end the national and foreign power monopolies (Bellisario, 2007a: 12). The government argued for four key components to be addressed: high dependency on foreign markets; high rates of socio-economic and political marginality; economic orientation top satisfying high income groups; and extreme concentration of property and income (Bellisario, 2007a: 12). Allende put rural poverty as the top priority, and extended the agrarian reform to poor peasants and agricultural workers. A 1973 law extended expropriation eligibility to those 40-80 BIH as well as over 80 BIH (Murray, 2003: 195). The hope was that expropriations and technical assistance would catalyse productivity and strengthen *campesino* organisations. In the end, Allende succeeded in expropriating 4,403 estates of 6 million ha, benefitting 55,279 people. Of the irrigated land, 58% was expropriated, and 42% of arable land was expropriated (Bellisario, 2007a: 14-15). Groups of better-off peasants responded to what they deemed unsatisfactory changes by withholding produce, which combined with declining imports and increased consumption to lead to shortages. This contributed the 1973 coup, due partly to peasant unrest over the slow-moving reform, and rise in violent land seizures. Very few land reserves were given to the former land owners and there was no monetary compensation (Murray in Brass, 2003: 195).

The military led by Augusto Pinochet wrested control from Allende in 1973. Pinochet's administration sought the return of a productive agricultural sector by dismantling ISI and aiding the fruit, fishery, and forestry sectors to grow the natural resource and the non-traditional agricultural exports (NTAE). In 1973 began what has been called the Agrarian Counter-Reform, in which expropriations

were stopped, all staff of the Agrarian Reform Corporation (CORA) were dismissed and replaced, and state-held lands were redistributed (Bellisario, 2007a). From 1974-1975, 1,736 estates were returned to their original owners (Bellisario, 2007a: 19). Rather than reversing the Agrarian Reform, the 'counter-reform' was akin to a reconstruction of a new rural bourgeoisie in the context of a completely transformed set of social and technical relations (Bellisario, 2007a: 25). This was not accidental, but was a key impetus in forming the class and system to produce NTAE and catalyse Chilean economic development.

The new CORA redistributed 41% of the expropriated land to 54,564 peasant families, though 15% received land unsuitable for agricultural cultivation. CORA did not, hwoever, reassign water. This new distribution became 65,000 new land units out of an original 5,800 estates. These nine million hectares, or 59%, of Chile's agricultural land sustained the emergence of a new capitalist class. An additional 37, 405 received parcels averaging 10 BIH. As for the rest of the land: 33% of total land returned to its original owners, 21% went to family agricultural units, 9% to public institutions, and 16% was auctioned off to private bidders (Bellisario, 2006: 171, 199; Bellisario, 2007a: 20-25). Had this land been put to use under the 36,000 possible recipient peasant families or into cooperatives of reformed and non-reformed *campesinos*, the agrarian development path may have been one "from below", a capitalism built by the peasants themselves rather than by mid- to large-scale farms (Bellisario, 2007b). An added strain was the Pinochet administration's poor support for credit, machinery, technical support, and irrigation infrastructure for farmers (Bellisario, 2007b: 173). From 1979 the Agrarian and Livestock Service (SAG) attended to water allocation for the reformed land.

In summary, the agrarian reform totally restructured society, breaking down landowners' monopoly on land, spearheaded a land market that helped found capitalist agriculture, and expropriated land from inefficient *latifundia* to productive peasants. According to Gomez and Echenique (1988: 101), the changes in land tenure structure from 1965 to 1973 was not such a transformation as a small reshuffling, as their data shows that the number of holdings between 0-5 ha grew in number but fell as a percentage of the whole, whereas land holding increments of 5-20 ha, 20-40 ha, and 40-80 ha each grew, and the reformed sector took up 2.4% of the whole.

### Annex 2: *Amendment to the Water Code, 2005 (DGA, 2005)*

The 2005 Amendment instituted several significant changes to the 1981 Code:

- Where there is contestation over two or more rights for groundwater resource exploration on public land, the DGA will decide by auction.
- Article 122 further pushed for a public register of use rights to serve as sufficient background to determine the uses of water likely to be regularised. The holders of water rights, whatever their origin, must enrol in the Public Register of Rights Water Use.

- Affirms the DGA's responsibility to appoint water rights in accordance to the preservation of nature and the environmental protection, for it must establish a minimum ecological flow, which only affect new rights that are formed, for which it must consider also natural conditions relevant to each source superficial.
- An annual license tax will be placed on the unused proportion of their flow.

**Annex 3**

**Agricultural and Forestry Producers by original community**

| REGION | Total | |
|---|---|---|
| | Informants | Land Area (ha) |
| Country Total | 46,355 | 946,393.55 |
| I of Tarapacá | 1,219 | 143,539.72 |
| II of Antofagasta | 937 | 2,330.85 |
| III of Atacama | 135 | 2,304.40 |
| IV of Coquimbo | 21 | 111.30 |
| V of Valparaíso | 330 | 1,905.37 |
| VI of O'Higgins | 7 | 100.10 |
| VII of Maule | 15 | 172.10 |
| VIII of Bío-Bío | 2,627 | 75,123.95 |
| IX of La Araucanía | 31,426 | 383,781.56 |
| X of Los Lagos | 4,479 | 120,622.80 |
| XI of Aysen | 40 | 9,891.38 |
| XII of Magallanes y Antártica | 28 | 9,578.27 |
| Metropolitan Region of Santiago | 13 | 82.30 |
| XIV of Los Ríos | 4,128 | 59,247.39 |
| XV of Arica y Parinacota | 950 | 137,602.06 |

*Source:* Chile National Institute of Statistics 2007