Chapter 22
Food Efficient Planning and Design for Peri-Urban Neighbourhoods

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Abstract  Peri-urban areas are the strategically most important emerging built environments that need to integrate appropriate food efficient design and planning. This chapter aims to understand food responsive design and form specific characteristics of new residential neighbourhoods in peri-urban areas. A review of three key food urbanism approaches was conducted. Two international master planned community case studies from the United States of America (USA) that apply ‘Agrarian Urbanism’ principles were analysed. A small scale residential neighbourhood case study in Sydney, Australia was redesigned to test applicability of these principles as identified through the review and analysis. Results from these case studies, emphasise the importance of protecting land in the peri-urban locations. Appropriate design and planning approaches can contribute significantly. Developing a strong evidence base; understanding community aspirations; formulating appropriate planning policy and recognising transdisciplinary connections of food efficient design and planning would be vital for building resilient communities of the future.

Keywords  Agrarian urbanism • Master planning • Food efficient design • Peri-urban planning • Local food production

22.1  Introduction

Increasing needs to accommodate future population have driven rapid urban expansion and consumption of food production spaces mainly agricultural land located at the rural-urban interface. Land use changes are shaped by demand, peoples’ choices, environmental settings, socio-cultural factors and planning and design regulations (Hall 2010; Gleeson 2006). Research has recognised the importance of integrating local food production spaces and practices in designing new and retrofitting human
environments (Grimm 2009; Duany and Duany Plater-Zyberk & Co (DPZ) 2010; Ghosh 2012; Donovan, Larsen and McWhinnie 2011). Peri-urban areas are strategically placed and have important transforming built environments that need to integrate appropriate food efficient design and planning for future. This chapter builds on the author’s earlier research and focuses on exploring food efficient design and planning options for peri-urban neighbourhoods.

22.2 Aims and Objectives

Peri-urban areas are undergoing morphological changes through continuing urban development processes. This chapter aims to identify food responsive design and planning approaches, principles and form specific characteristics essential for new and existing peri-urban residential neighbourhoods. The main four objectives of this chapter are to:

- review three key food urbanism principles, models and methods for food efficient design and planning;
- analyse two master planned community case studies from the USA: Serenbe, Georgia and Prairie Crossing, Illinois;
- determine ways of incorporating principles from the review and two case studies in a small scale concept plan for a residential neighbourhood case study in Sydney; and
- identify a set of key future research areas that would significantly benefit and guide peri-urban neighbourhood planning and policy.

22.3 Research Method

The research methodology of this chapter integrated systematically the processes of review, analysis and recommendations and consisted of four main steps.

Firstly, three contemporary and relevant design and planning approaches: ‘Conservation Subdivision’, ‘Typology of Continuous Productive Landscapes’, ‘Four Models of Food Urbanism’ and ‘The Transect’ that are applicable to peri-urban neighbourhood planning were selected for a review. These three approaches are pertinent as they exemplify emerging as well as continuing urban design theories and practice. These approaches place central significance on design and planning for protecting natural areas and food production resources; creating a sustainable urban or suburban form; providing solutions for accommodating urban growth positively at the urban fringes; putting emphasis on context based social and community development and generating a local food economy as an integral part of responsive built environments. The review was conducted and the effectiveness of these approaches were discussed and compared based on nine factors: design with
nature; agricultural and natural area protection; urban form typology; subdivision planning; social connectivity; environmental benefits; economic values; spatial scale and suitability to peri-urban planning.

Secondly, two international master planned food urbanism case studies from the USA were selected based on the outcomes of the review and were analysed from neighbourhood design and planning perspectives. Two case studies from the USA selected were: Serenbe, Atlanta and Prairie Crossing, Chicago, Illinois. These case studies are located in the peri-urban areas and followed new urbanism principles of place making and developing new communities and built environment patterns that are sympathetic to nature. The case studies were analysed based on nine important factors: design and planning; agricultural and natural area protection; built form typologies and neighbourhood design; social and cultural networks; environmental sustainability; ecological benefits; local economic values and greenfield development model. The most important elements applicable for successful peri-urban neighbourhood design and planning were identified from the analysis of these case studies.

Thirdly, applicability of food efficient planning and design principles in a Sydney case study was examined. A comparatively new residential neighbourhood case study from Penrith City Council in Sydney was selected. Penrith City is located approximately fifty four kilometres from Sydney Central Business District (CBD) at the fringes of Sydney Metropolitan Area (Penrith City Council 2014a). Using Geographic Information Systems (GIS) methods, existing morphological characteristics and allocation of different land cover patterns (such as built up roof areas, roads, paved driveways and surfaces, tree canopy cover and other areas) were calculated to understand conventional neighbourhood design for this case study. A hypothetical redesign exercise on a small scale Sydney case study was conducted applying the relevant principles identified from the review and analysis of two international case studies. A simple conceptual neighbourhood plan was prepared for the Sydney case study. This process allows validating how the present neighbourhood design characteristics could have been altered to accommodate food efficient design and planning principles. An evaluation and justification for the redesign assist in comprehending possible positive changes in peri-urban neighbourhood planning in an Australian context.

Finally, recommendations formulated as outcomes of this research include identification of a set of key beneficial future research areas and a discussion on essential peri-urban neighbourhood planning policy that could guide successful food efficient peri-urban neighbourhood planning at the urban fringes.

22.4 Literature Review

Peri-urban zones have been defined diversely by different research approaches and various typologies of peri-urban environments exist (Iaquinta and Drescher 2000). In general, peri-urban areas are non-urban; located at the urban and rural interfaces.
and have actively transforming land uses. In these areas ‘quality of urban environments, including township character, ecosystems and productive agricultural land is under increasing pressure’ and therefore, ‘planning for growth’ is vitally important for these areas (Department of Transport, Planning and Local Infrastructure, Victoria 2014). Current research on design and planning of human environments, in synergy with nature, covers a broad field. Provisions for growing food within built environments in different density developments are fundamental to this concept and closely link with design and planning agendas for cities and towns of the future. Literature review for this chapter focuses mainly on three of food urbanism approaches: ‘Conservation Subdivision’ (Arendt 2010a, b); ‘Continuous Productive Landscape’ (Grimm 2009) and ‘Four Models of Food Urbanism’ and ‘The Transect’ (Duany et al. 2010). These three approaches are significantly important as these approaches could be applied effectively to peri-urban planning.

22.4.1 ‘Conservation Subdivision’ Approach

Arendt (2010a) argues that designing a new urban development using ‘Conservation Subdivision’ principles could maximise economic values, protect land resources and create a sustainable community. ‘Conservation subdivision’ approach follows a four step design process (Arendt 2010a). The first step includes identifying open spaces on site in order to preserve existing natural or environmentally responsive features and potential development zones. In the second step, potential housing locations are decided so that overall neighbourhood design and access to facilities (such as squares, greens and parks) could be finalised to maximise the environmental and economic values of the properties. Third step incorporates design and planning of various types of movement patterns which include pathways and trails for pedestrians or cycles as well as streets for vehicular accesses to houses. In the final step the different lot boundaries are decided which is considered the least significant part of the overall design process (Arendt 2010a). This ‘Conservation Subdivision’ design process is notably different to ‘Conventional’ design approach (Fig. 22.1)

![Fig. 22.1 Comparison between ‘Conventional’ and ‘Conservation Subdivision’ approaches (Source: Arendt 2010b, Drawn by: Sumita Ghosh)]
and situates primary importance on the conservation of land in orchards, agricultural and other food producing areas, preservation of natural vegetation and historic features; maximises economic values of the properties with provisions for living within natural settings and creates minimal environmental and ecological impacts on earth. Provisions for different types of food growing spaces in home and community gardens at smaller urban scales and farmland managed by community supported agriculture (CSA) at a larger scale are possible using this approach (Arendt 2010a). ‘Conservation subdivision’ approach is very useful for applications to peri-urban planning. It acknowledges the immense value of ‘The Transect’ concept detailed later in this chapter.

22.4.2 ‘Continuous Productive Landscape’ Approach

Grimm’s (2009) research based on designing a ‘typology of continuous productive landscapes’ is integrated with new or retrofitted existing built environments. It adopts a complete food system design approach in relation to various typologies of urban spaces across low to high development densities at different spatial scales. ‘An urban food system … food production, processing, distribution, marketing, consumption and waste management in an urban landscape’ (Grimm 2009, p. 8). In a case study of Story County, Iowa in the USA, six types of local food production sites determined what could be embedded in a settlement as important green infrastructure: private residence gardens, community/allotment gardens, food boulevards, institutional food gardens (religious/education/non-profit), neighbourhood farms and urban farms (Grimm 2009). The typologies of food spaces are categorised based on five key criteria based factors: user/producer/manger (management of the productive activity); scale (productive space area as a share of total site/activity); characteristics (utility infrastructure provided, level of community services and public ownership); production types (layout plan, circulation and facilities on production site) and distribution/markets (direct/indirect) (Grimm 2009). Figure 22.2 explains further how these different typologies of food production spaces could be integrated within our built environments. This research argues that integrating a complete food system in a built environment setting with daily activities would facilitate a healthy, sustainable and socially connected community. This is a meaningful approach which aims to reorganise, design and utilise to a greater extent any available urban spaces for food production. Thus, a primary focus of this approach on ‘food urbanism’ is relevant across peri-urban, inner city and suburban planning contexts.

22.4.3 Four Models of Food Urbanism and ‘The Transect’

A pioneering urban design theory for planning and designing food efficient sustainable communities developed by Duany et al. (2010) in this field has identified four models of food urbanism: ‘Agricultural Retention’, ‘Urban Agriculture’, ‘Agricultural Urbanism’ and ‘Agrarian Urbanism’ (Duany et al. 2010). Designing
and planning for food efficiency lies at the heart of built environment designs in these four models. The variations of these four models are reflected in their designs, economical settings, operational processes, opportunities, community development and outcomes. It is evident that each of these models is associated with or generates a set of unique form specific or morphological characteristics. The notion of ‘Agricultural retention’ relates to protection of farmland at a regional scale, while ‘urban agriculture’ idea refers to local food production on any available land such as vacant land, brown field sites, home gardens etc. at a local scale within a settlement (Duany et al. 2010 pp. 7–8). ‘Agricultural urbanism’ originated from Ebenezer Howard’s garden cities conceptual framework and visualises a working agricultural farm on which resident community and businesses are economically dependent and ‘food production forms the basis for urban density’ (DPZ 2014c). Southlands development with an area of 218 ha in Vancouver, British Columbia is an example of a master planned community based on the ‘Agricultural Urbanism’ model (DPZ 2014c; Congress for New Urbanism (CNU) 2010). Principles of the ‘Agrarian Urbanism’ model link food efficient designs to new urbanism principles. This model initiates an intentional sustainable agrarian society and community development with a complete food system such as production, distribution and disposal (Duany et al. 2010 pp. 7–8). Hampstead is an area of 168 ha of traditional neighbourhood development in Montgomery, Alabama, USA which supports principles of ‘Agrarian Urbanism’ and ‘Smart Code’ or a transect-based zoning and planning model (DPZ 2014d). ‘Agrarian Urbanism is a concept that involves food not as a means of making a living, but as a basis for making a life and structuring the places in which we live’ (DPZ 2014a). In this chapter, a total of two master planned community case studies: Serenbe, Atlanta and Prairie Crossing, Illinois from the USA are analysed following ‘Agrarian Urbanism’ principles to identify how food urbanism principles are incorporated in design and planning.
The ‘Agrarian Urbanism’ approach is intrinsically linked to ‘The Transect’ concept (DPZ 2014b). ‘The Transect’ as a planning strategy (Talen 2002) provides a realistic basis of zoning for different types of development patterns along a rural-urban continuum (Duany 2002; Duany et al. 2010; The City of Miami 2014). ‘The Transect’ has special districts (SD) and six broad land use zones: natural (T1), rural (T2), suburban (T3), general urban (T4), urban centre (T5) and urban core (T6) (Duany et al. 2010; The City of Miami 2014). Special districts (SD) (such as airports, rail yards etc.) are special purpose or have larger areas and are regulated by specific zoning requirements different from these six land use zones (Sorlien 2015). Out of the six main land use zones identified, T2 Rural and T3 Suburban zones could link efficiently to peri-urban zones. Miami 21, an integrated zoning code was developed based on ‘The Transect’ conceptual framework and has been adopted for planning in The City of Miami (2014). ‘The Transect’ structures different urbanism elements for different zones; represents ‘an index of diversity’ (Duany 2002, p. 257) and integrates spaces for agricultural or food production practices in designing new food urbanist communities along the different zones of ‘The Transect’. Figure 22.3 presents an overall cross section of different land use zones in ‘The Transect’.

22.5 Research Analysis

22.5.1 Effectiveness of Three Food Urbanism Approaches

There are immense possibilities for incorporating attributes of three urbanism approaches in designing new communities in rural and suburban zones or in peri-urban areas. It is very clear from these approaches that preservation of natural vegetation and food producing spaces are absolutely important. The ‘Agrarian Urbanism’ model is considered the most comprehensive and holistic approach out of the four models as food has a significantly deeper meaning in terms of settlement planning and community development. Effectiveness of these three approaches: ‘Conservation Subdivision’, ‘Continuous Productive Landscapes’ and ‘Agrarian Urbanism’ approaches are compared in Table 22.1 following the analysis criteria for review.
It is essential to reorient conventional design and planning practices and planning policy to adopt new approaches and to maximise the social, environmental and economic benefits of local food production, preservation of, and proximity to, natural areas, improvements in community health through human–nature interactions, self-sufficiency and thriving local economy in lower density developments. New approaches to design and planning would accommodate urban growth and lifestyle choices in the urban fringes in a sustainable and responsive manner; protect vital land resources and vegetation and generate sustainability awareness and resilient communities of future.

### 22.5.2 An Analysis on Two Master Planned Case Studies

#### 22.5.2.1 Case Study One: Serenbe, Atlanta, USA

Serenbe is a master planned award winning community with an area of 1,000 acres or 405 ha built in the Chattahoochee Hills as part of a 40,000 acre or 16,187 ha city in Atlanta in the USA. Serenbe, located at the city fringes was developed by Steve and Marie Nygren (Development Concepts Incorporated 2014). It aims to
accommodate a traditional lifestyle community; protect at least 70% of the total site as a green space and to offer residents wellbeing and the benefits of living in natural settings (Development Concepts Incorporated 2014). Currently a total of 400 residents live at Serenbe; hamlets are villages responsively designed with minimal environmental impacts and have a variety of housing choices available (Serenbe Development 2014). Roads are designed maintaining natural topography of the land and pedestrian pathways and nature trails provide ample opportunities for easy walking. Significant tree canopy cover provides carbon storage and sequestration benefits. A certified organic farm, Serenbe Farms, produces 300 different types of vegetables, herbs, flowers, and fruits reducing farm-to-table distance, supplying to three local restaurants: Blue Eyed Daisy Bakeshop, The Farmhouse and The Hil (Serenbe Development 2014) thus forming a close loop local food cycle. The local food production in this development has adopted a community supported agriculture (CSA) program. Serenbe Farmer’s and Artisan Market assists in the food distribution process within the local community (Serenbe Development 2014). Figure 22.4 presents design and site planning of Serenbe development.

Considering nine identified important factors for case study analysis, Table 22.2 presents the case study one, Serenbe in the USA. Concepts applied in Serenbe are also applicable in peri-urban neighbourhood planning in developing a food efficient sustainable community.

*It is a national model for the future of balanced development in the U.S. — focusing on land preservation, agriculture, energy efficiency, green building, walkability, high density building, arts and culture, and community living for multiple generations.* (Imery Group 2016)
Table 22.2  Case Study One: Serenbe, Atlanta, USA

| Criteria                                           | Case Study One: Serenbe, Atlanta, USA |
|----------------------------------------------------|---------------------------------------|
| **Design and planning**                            | Organic design and planning with high importance to preservation of natural areas and creating a sustainable community, 1000 acres or 405 ha |
| **Agricultural and natural area protection**       | 70% mandatory preserved green space on total site devoted to 30 acre or 12 ha farming and natural trails and vegetation; |
| **Built form typologies and neighbourhood design** | Mixed housing types: separate houses, town houses and live-n-work houses in low to high densities; transit oriented design, commercial spaces, omega shaped hamlet to initiate active living practices, walkable paths and curvilinear streets |
| **Social and cultural networks**                   | Serenbe Art Institute; Communal gathering spaces; urban design elements e.g. street facade design to maximise public realm |
| **Environmental sustainability**                   | Mandatory green building standards by EarthCraft Home and LEED certified buildings; geo-thermal heating for buildings; waste recycling and composting, alternative fuel usage; water efficient measures 25% less water usage, |
| **Ecological benefits**                            | Tree canopy store 1,333,840 US tons of carbon and annually sequester 52,660 US tons of carbon and remove US1,484.01 tons of air pollution; bio retention, wetlands and other water sensitive practices; Landscaping with EarthCraft Certified Native and organic plants |
| **Local economic values**                          | 25–50% more values for properties as located around green spaces; Acts as a cultural destination for people in the town and tourists; Serenbe Farm with an area of 30 acres or 12 ha produce certified organic and biodynamic food products and distribution through CSA program and in weekend markets and farm tours; Community has three restaurants; |
| **Greenfield development model**                    | Excellent model for a greenfield development |

Note: 1US ton = 0.907 Metric ton
Sources: (Serenbe Development 2014; Development Concepts Incorporated 2014)

22.5.2.2  Case Study Two: Prairie Crossing, Illinois, USA

Prairie Crossing is a ‘conservation community’ (Prairie Crossing 2014) built on 668 acres or 270 ha by Vicky and George Ranney in Chicago, Illinois in the USA (Ranney et al. 2010). This development actively engages agriculture as a central focus to creating a new community and development (Ranney et al. 2010). This case study integrates ‘Agrarian Urbanism’ principles and ‘New Urbanism’ methods in design and planning. Creating liveable environments with varied density patterns, public transport access, and organic nature of design which is vernacular to the native prairies landscape are unique to this development. Role of growing food extends beyond simply producing own food. Food establishes new pathways for enabling successful social networks and community participation processes and forms a reliable economic base for an agrarian society.

Community connectedness and a sense of belonging are created by activity patterns and generated by the development and gazebo concerts, farm markets and places like Byron Colby Barn offering venues for events, lectures, concerts within the Prairie Crossing development (Prairie Crossing 2014). Figure 22.5 presents the site plan for the Prairie Crossing development. Table 22.3 analyses the important
Fig. 22.5 Site plan, Prairie crossing, USA (Source: Prairie Crossing 2014, Drawn by: Sumita Ghosh)

Table 22.3 Case Study Two: Prairie Crossing, USA

| Criteria                                      | Case Study Two: Prairie Crossing, Atlanta, USA                                                                 |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Design and planning and total area of development | Design and planning with primary importance to provisions for agricultural or productive land and preservation of natural areas and creating a sustainable community around farming as the main activity. 668 acres or 270 ha |
| Agricultural and natural area protection      | 60% of total site is open space and 100 acre or 40.5 ha devoted to organic farming for three separate farming organisations; Pastures, lakes and ponds, 165 acres or 67 ha of restored native prairies and 20 acres or 8 ha of restored wetlands and 16 acres or 6.5 ha of historic hedgerows form the outdoor environments |
| Built form typologies and neighbourhood design | Mixed-use commercial, housing types – 360 single family homes and 36 condos; transit oriented design with 2 train stations, 3 schools, learning institute and community centre |
| Social and cultural networks                  | Communal gathering spaces; urban design elements built forms, colours and landscaping of natural prairies for place making, public health and social wellbeing in working together in a food based community and 10 miles or 16 km of trails promoting active transport and engagement |
| Environmental sustainability                 | Strom water runoff filter through wetlands and ponds; U. S. Department of Energy-approved “green” construction techniques applied to buildings |
| Ecological benefits                           | Maintaining of large areas of natural vegetation and organic farming,                                        |
| Local economic values                         | Prairie Crossing farm with an area of 100 acres or 40.5 ha creates a local food system and economic values. Three farm organisations and local businesses and connect to regional food initiatives and farm-based educational opportunities |
| Greenfield development model                  | Excellent model for greenfield development                                                                    |

Sources: (Prairie Crossing 2014; Ranney et al. 2010)
characteristics of this development considering the nine identified important multi-dimensional factors for analysis.

22.5.3  **Key Principles from Two Case Studies**

The two case studies, Serenbe and Prairie Crossing, put an immense emphasis on the importance of protecting land in the peri-urban locations. Appropriate design solutions and case specific planning processes can assist in protecting land for food production; preserving natural areas and developing a responsive community.

Using a suitability analysis, building locations are suggested on the sites after finalising the preserving of natural features. In these two very different cases two unique patterns of development emerge at the city fringes. These case studies establish that agendas for resource efficiency, efficient environmental design and planning and applications of new urbanism principles of walkability, transit oriented design, mixed use housing, local economic development, good architectural styles and urban design concepts are feasible in creating new communities in peri-urban areas. Four key principles emerge that could be applied in a peri-urban residential neighbourhood context follow.

- Preservation and creating a connected open space network that integrates natural areas as well as food production spaces with built forms within and beyond the site;
- Designing and planning for traditional and compact built forms following ‘Agrarian Urbanism’ principles and sustainable new urbanist methods of responsive built design;
- Creating social activities that create new community connectedness and engagement and a sense of wellbeing and belonging to the place;
- Activities that promote local economic development through a complete local food system, quality property development potential and offer preferred lifestyle options at the least cost to the earth;

22.5.4  **A Small Scale Case Study in Sydney**

A comparatively new residential neighbourhood case study from the Penrith City Council in Sydney was selected. According to Penrith City Council proposed Local Environmental Plan (LEP), proposed zoning is R2 Low Density Residential and proposed subdivision size is 650 m$^2$ (Penrith City Council 2014b). Landscaped area containing private open space should cover a minimum of 50% of the site (Penrith City Council 2014b). Using GIS the spatial distributions of land cover types were estimated. Land cover pattern at an overall site constitutes of 33.4% built up area, 11.8% road area, 5.6% tree canopy cover, 11.2% paved areas such as driveways, 20.1% lawn and the remaining 18% includes land areas in other uses, grass verge
and ancillary structures. The existing pattern of design and planning of this peri-
urban neighbourhood followed conventional design and is dominated mainly by
large subdivisions, single detached housing with larger footprints and individual
private gardens. Land uses/land covers were estimated for the overall site and
together with parcel area levels are included in Table 22.4. Figure 22.6 presents the
land cover pattern map.

Considering the four key design and planning principles from the review and
case studies’ analysis, this small scale case study was redesigned. Figure 22.7 out-
lines the concept plan and the built forms, movement network and open space/local
food production network within this case study. The proposed concept plan of
Sydney highlights that it is possible to design appropriate medium to low density
built forms for new developments with protected land areas that could continue to
be used as open spaces such as common greens which could be used as community
gardens. An allocated community garden space could foster social networks and
any food produced on site could build food efficient communities. Two housing
types: town houses on smaller plots and separate houses on larger plots provide
varied housing choices. A continuous street facade is created with two to three sto-
ried separate houses along the street. Ground footprints of separate houses are
reduced maximising the open spaces in the backyards and the required floor spaces
are allocated to the upper floors in each house. The home gardens create a continuous
green/biodiversity corridor which is connected to other typologies of food produc-
tion spaces such as pocket parks, community gardens, allotment gardens and linear
boulevards for edible landscaping on the site and beyond. Penrith City Council’s has
design controls for creating a green corridor along rear boundaries; ‘preserving

Table 22.4   Land cover pattern in the Sydney case study

| Category                                             | Sydney case study, Penrith City Council Area (m²) |
|------------------------------------------------------|--------------------------------------------------|
| Site area                                            | 21,115 (21 ha)                                   |
| Total parcel area                                    | 15,864 (15.9 ha)                                 |
| Total building roof area                             | 7044                                             |
| Total road area                                       | 2494                                             |
| Total tree canopy                                     | 1188                                             |
| Total paved area (driveways and surfaces)            | 2358                                             |
| Total lawn area                                       | 4239                                             |
| Miscellaneous/others (land area in other uses, grass verge and ancillary structures) | 3791 |
| Dwelling density per hectare                          | 18                                               |
| Total number of parcels                               | 38                                               |
| Average parcel size                                  | 417 (100 %)                                      |
| Average lawn coverage/average parcel                 | 112 (26.7 %)                                     |
| Average paved area coverage/average parcel           | 49 (14.9 %)                                      |
| Average tree canopy coverage/average parcel          | 31 (7.5 %)                                       |
| Average built roof coverage/average parcel           | 185 (44.4 %)                                     |
Fig. 22.6  Land cover distribution, Sydney case study, Penrith City Council

Fig. 22.7  Concept plan of Sydney case study (Drawn by: Sumita Ghosh)
remnant vegetation’ and ‘providing new shelter and habitat’ (Penrith City Council 2006 p. 23). In this case, although overall density of the site in the concept plan lay at low density and mixed density development of built forms, integration of different food production spaces and altering the road network could create meaningful liveable environments and integrate new urbanist designs in rural or suburban settings.

This Sydney case study was focused on a small residential neighbourhood. In order to comprehend transit oriented and the farm based nature of neighbourhoods, a redesign exercise of a larger scale case study considering natural vegetation, agricultural land, built up areas and movement networks would be required to translate all the key principles of ‘Agrarian Urbanism’ and new urbanism. This concept plan tested an alternative design and planning option for a peri-urban residential neighbourhood.

22.6 Discussion

In this chapter three approaches: ‘Conservation Subdivision’, ‘Typology of Continuous Productive Landscapes’ and ‘Four models of food urbanism and ‘The Transect’ were reviewed. This review provided theoretical understanding of current food urbanism approaches that are focussed on applicable and relevant design concepts in peri-urban planning and transition zones. The comparison of three conceptual approaches indicates that ‘Typology of Continuous Productive Landscapes’ (Grimm 2009) is at a human settlement scale where design and planning of hierarchical food production spaces could be integrated with new and retrofitted built environments. This could create significant changes in urban, suburban and rural morphologies and provide community resilience and self-sufficiency. The complete food system guides the design of built environments. In this approach, ‘urban agriculture’ as one of the four food urbanism models (Duany et al. 2010) of growing food on vacant land, brown field sites, home gardens etc. at a local scale is prominent. ‘Conservation Subdivision’ approach maximises the protection of land and natural areas but the ‘Agrarian Urbanism’ approach builds on the deeply rooted concept of creating a food efficient society; takes an integrated approach to design, planning and sustainability and incorporates new urbanist design and planning methods even in general lower density development settings.

The two international case studies, Serenbe (Serenbe Development 2014) and Prairie Crossing in the USA (Prairie Crossing 2014; Ranney et al. 2010) analysed in this chapter, present an agrarian community development initiative and are excellent examples of the ‘Agrarian Urbanism’ approach to master planning of new communities. In these examples, communities designed following the principles and techniques of new urbanism and protection of natural areas and farm lands are answers to future peri-urban policy implications and for accommodating urban growth in suburbs and rural areas in a compatible fashion. Growing food in home and community gardens and farms are associated with improved social connections;
enhanced mental wellbeing; healthy communities with increased access to nutritious and fresh food and reduced ‘farm to plate’ distance (Ghosh 2012). These case studies have demonstrated that significant environmental and ecological benefits could be achieved through improved energy and water efficiency, ecological design and planning by enhancing biodiversity protection, creation of wildlife corridors, tree canopy cover providing carbon storage and sequestration and reduction in air pollution benefits. Increased areas of pervious surfaces would reduce heat island effects, temperature rises and other climate change impacts. Quality urban design characteristics and proximity to nature could create liveable environments and amenity values and increases in property prices. Donovan et al. (2011) makes transdisciplinary connections between food sensitive planning and urban design. Four key principles of design and planning highlighted in these case studies support an integrated approach to peri-urban design and planning.

Hall’s (2010) recent research on Australian backyards demonstrates an increasing trend of large sizes of contemporary detached suburban houses with comparatively small backyard spaces. The Sydney contemporary residential case study with a conventional design approach, generated a neighbourhood at an overall site level with high impervious cover of 23%, larger building footprint cover of 33.4%, and significantly lower tree canopy cover of 5.6% with 20% of areas allocated as lawn covers (Table 22.4). For this development a built up cover of 44.4%, paved cover of 14.9% and lawn cover of 26.7% is estimated as an average parcel level. Higher lawn cover is positive as this land cover could be converted to productive uses while impervious cover by built up areas and paved surfaces should be reduced further. Immense social and ecological benefits are associated with Penrith City Council’s single dwelling advisory controls such as maintenance of a green corridor of trees and shrubs along rear boundaries; conservation of remnant vegetation and improved biodiversity (Penrith City Council 2006: 23). However these are not well translated in the design and planning. Lack of careful considerations on existing natural and protection worthy features of the site at the design stage could result in a subdivision pattern of a fragmented landscape of open spaces and private gardens, non-sympathetic nature conservation and a loss of productive spaces. An alternative design option as presented in Fig. 22.7 for this neighbourhood puts a case forward that, in fact, spaces could be allocated to productive uses even within a small neighbourhood. Applications of the four step design process in the ‘Conservation Subdivision’ approach, suitable typologies of food production spaces and key principles of ‘Agrarian Urbanism’ and other food urbanism models together could create an efficient peri-urban neighbourhood design with optimum numbers of subdivisions designed in synergy with nature and with increased property values. Key future research areas were identified through the analysis process and should focus on exploring the following.

- To explore connections and build a strong evidence base on how food efficient design and planning of peri-urban areas could enhance social and community well-being;
- To conduct integrated performance assessments to understand the efficiency of operating food urbanism models at pre and post design stages for new and existing peri-urban developments;
• To undertake qualitative research on community aspirations, satisfactions and resilience in post occupancy phases in practical case studies;
• To understand how land use planning could be integrated with food oriented planning;
• To explore how new peri-urban planning and food policy could be effectively integrated with current urban planning policy;
• To develop a business model for farming communities for a successful complete food system plan so that a sound local economic base could be developed;
• To further comprehend trans-disciplinary connections of food efficient design of communities and planning.

Significant work needs to be done to build communities based on a food efficient design or from a food urbanism perspective. With the current patterns of a growing urban population, Australian cities are extending further and consuming rural landscapes. Planning for provisions for a secured food supply integrated with built environments is vital for current and future generations. It is also hugely important to preserve existing community characteristics as well as generating sustainability awareness and innovative food production and distribution programs. Future research should analyse global best practice examples, explore innovative solutions and develop principles and policy that would be specifically applicable for the Australian cities. Supports from local and State governments, private and non-governmental organisations, energy and water providers, developers, community and other stakeholders would be critical for the uptake. Education and awareness of communities and professionals would play an important role. An efficient, adequate and timely planning proposal approval process in an institutional setting would be essential for implementing the policies and plans efficiently.

22.7 Conclusion

Research presented in this chapter provides a snapshot of emerging design and planning theories, international progresses in building food focussed communities and possible applications of relevant principles in an Australian context. Three food urbanism approaches: ‘Conservation Subdivision’, ‘Typology of Continuous Productive Landscapes’ and ‘Four models of food urbanism’ and ‘The Transect’ concept provide deeper theoretical foundation for adopting food efficient design and planning. The two ‘Agrarian Urbanism’ case studies, Serenbe and Prairie Crossing, demonstrate that it is possible to protect land, natural areas and agrarian life style of communities; initiate local economic growth and accommodate urban growth sustainably using appropriate design and planning in peri-urban areas. The Sydney case study emphasise that conventional design approaches can be reoriented to create more meaningful solutions that can protect land for collaborative food production, such as community gardens; environmental and ecological benefits and can create successful social networks at a smaller spatial scale. This research highlights the immense importance of strategic and efficient land use planning and urban
design processes, food system planning, effective marketing techniques and community and professional involvement. Developing an evidence base and mandatory food efficient planning guidelines; understanding communities’ hopes; conducting transdisciplinary research; monitoring progress and continuing efforts to implement successful food efficient design and planning should be able to build resilient peri-urban communities of the future.

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